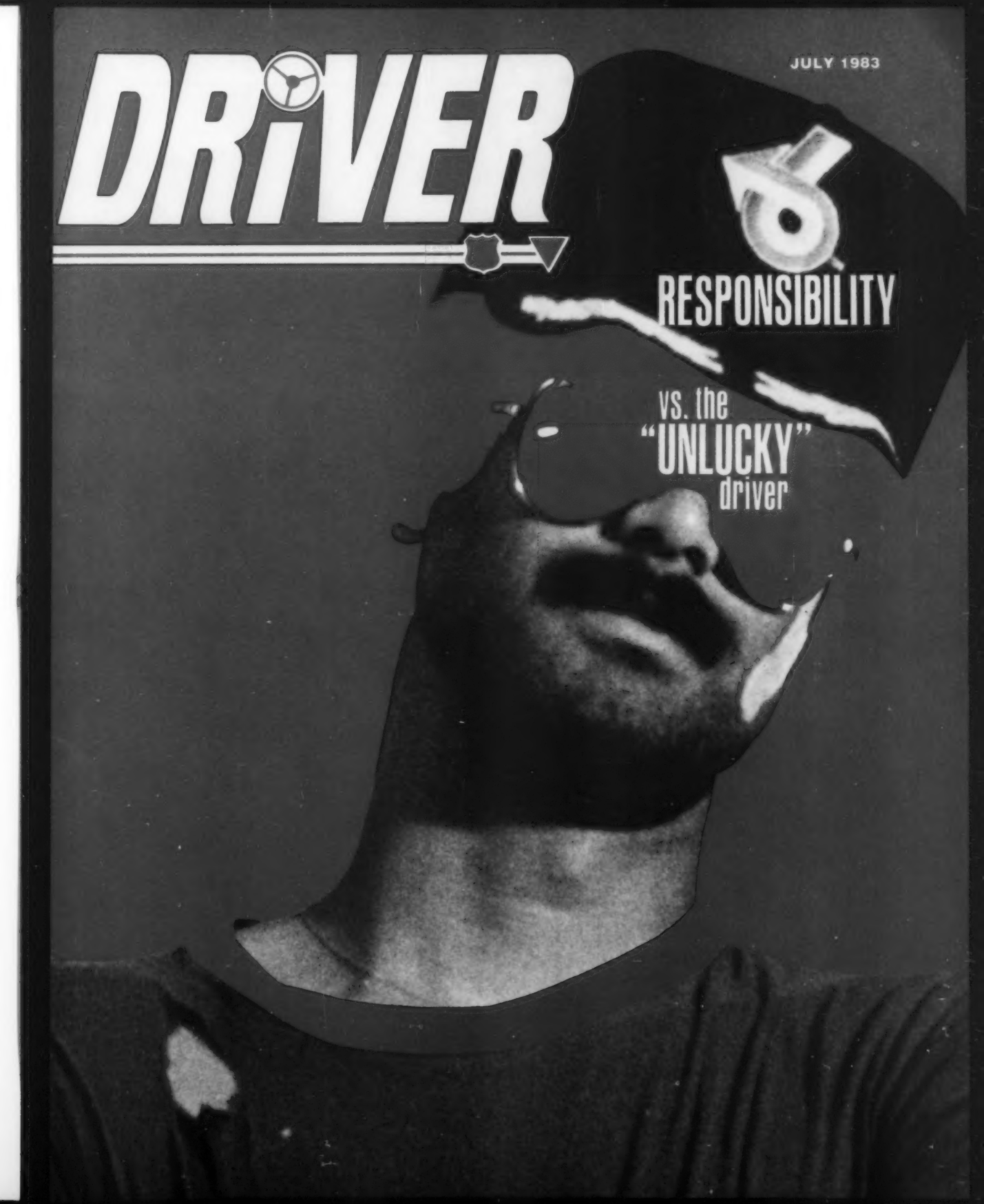
DRIVER

JULY 1983



RESPONSIBILITY

vs. the "UNLUCKY" driver

DRiVER

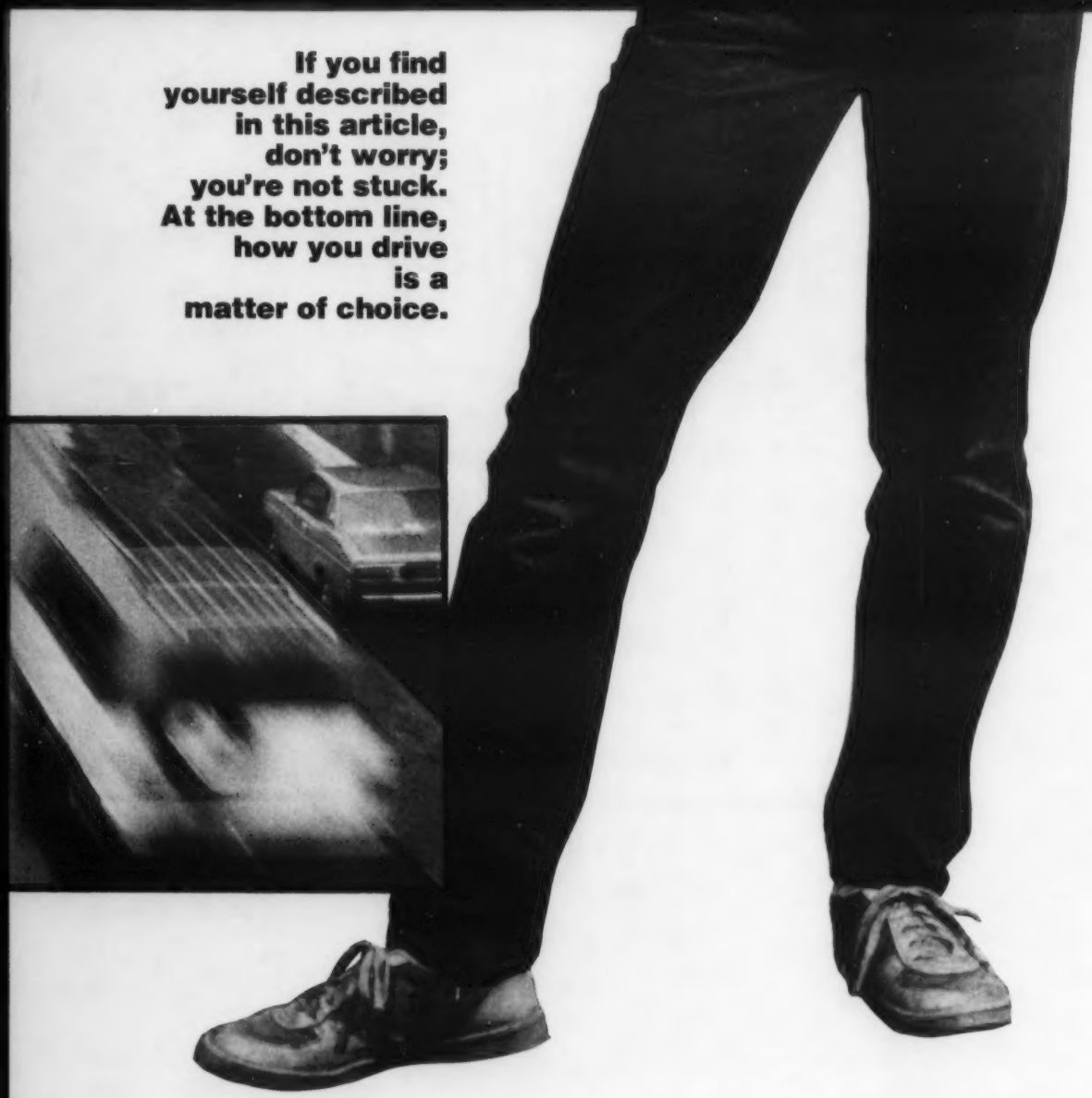
Responsibility vs. the "UNLUCKY" DRIVER

"Motor vehicles do not drive themselves and accidents are not produced by concrete roads or cloudy skies. They are produced by people – people made up of fears, hopes, impulses, and inhibitions." (McGuire, 1961)

Some drivers get into a lot of accidents and some have none at all. The drivers who have all the accidents like to call it a matter of luck. "Sure, I get into a lot of smash-em-ups, but I'm just unlucky. I'm no different from a lot of other guys. They're just luckier than I am."

Are they? Is it just luck, or is there a difference between the driver with no accidents and the multi-accident driver? Obviously, we here at

If you find yourself described in this article, don't worry; you're not stuck. At the bottom line, how you drive is a matter of choice.



DRIVER believe the latter. But for those who think otherwise, there is a large amount of research to support the idea that a certain type of person is more likely to have an accident.

This research can be summed up by the statement of Dr. W.A. Tillman: "Truly it may be said that a man drives as he lives. If his personal life is marked by caution, tolerance, foresight and consideration for others then he will drive in the same manner. If his personal life is devoid of these desirable characteristics then his driving will be characterized by aggressiveness and over a long period of time he will have a much higher accident rate than his more stable companion." (Tillman, 1949).

Of course, the driver who has one accident in his entire driving career probably is not much different from the one who never crashes at all. But here we will be looking at the two extremes — those who have repeated accidents, versus those who never dent a bumper.

The psychological studies of drivers who have repeated accidents always show the same basic person — immature, impulsive, unstable, intolerant of others and anti-authority. These traits are common in most high-accident drivers. The no-accident driver is more mature, more responsible, better adjusted emotionally, has respect for law, and is more goal-oriented.

That first description can be applied to many younger people. This is not to say younger people are abnormal or that they are all "accidents-waiting-to-happen." On the contrary, a certain self-centeredness is normal in younger people, and it becomes less pronounced once they mature and develop caution, control and a social con-

continued

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

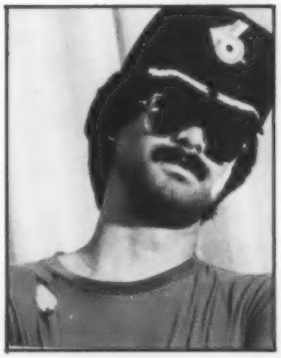
DRIVER

DEPARTMENT OF THE AIR FORCE
HQ AIR FORCE INSPECTION
AND SAFETY CENTER
Norton Air Force Base, California
92409

AFR 127-1 VOLUME 17 NUMBER 2
JULY 1983

CONTENTS

The Backyard Mechanic 20



Cover Story 1

Cast in the Same Mold 8

No Nicks — No Cuts 11

Form Follows Function 12

Adam and Evening 14

Double Tech 26

Backfire 28

The Domino Theory 30

Rah RAH 16

Hon VERNE ORR
Secretary of the Air Force

General CHARLES A. GABRIEL
Chief of Staff, USAF

Lt Gen ROBERT W. BAZLEY
The Inspector General, USAF

Maj Gen GERALD D. LARSON
Commander
Air Force Inspection
and Safety Center

Brig Gen GORDON E. WILLIAMS
Director
Aerospace Safety

PUBLISHED MONTHLY
IN COOPERATION
WITH THE
DEPARTMENT OF THE ARMY
AND THE
DEPARTMENT OF THE NAVY

Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

COMO JERRY C. BREAST
Commander
Naval Safety Center

Col WARREN L. BUSCH
Chief,
Safety Education Division

VIRGINIA HENDRIX
Editor

TSgt RON LATHROP
Technical Editor

JERI ROOD
Feature Editor

CINDY LIGHTHILL
Editorial Assistant

DON KELLEHER
Art Director

LORRAINE HAMBLEN
Staff Artist

ROBERT KING
Staff Photographer

Entered as a publication at the Second-Class rate (USPS No. 586-430) at San Bernardino Postal Service, 1331 South E Street, San Bernardino, CA 92403.

SUBSCRIPTION — DRIVER is published monthly and is available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Back issues are not available. Changes in subscription mailings should be sent to the above address. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No. payment can be made for manuscripts submitted for publication. Contributions are welcome, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, HQ AFISC/SEDD, Norton AFB, CA 92409.

Distribution: One copy for every 9 members of USAF.

ATTENTION DEPT OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS NORFOLK, VA 23511, Attn: Safety Publications Dept. All other correspondence will be welcomed by the Editor.

The purpose of this magazine is the prevention of vehicle accidents, and the contents are not directive unless so stated. Address reprint requests, stating intended use of material, to the Editor. The Editor reserves the right to make any editorial changes in manuscripts which will improve the material without altering the intended meaning.

The inclusion of names of any specific commercial product, commodity, or service in this publication is for information purposes only and does not imply endorsement by the Air Force.

Certain individuals shown in this magazine are not members of the Air Force and therefore do not conform to Air Force grooming standards.

continued

sciousness. But with these kinds of "me-first" traits, it is no wonder that the younger driving population is involved in a disproportionate share of accidents.

But don't take our word on the high- and low-accident personalities. Let's look at the research and the two "extreme" examples. (References are at the end of the article.)

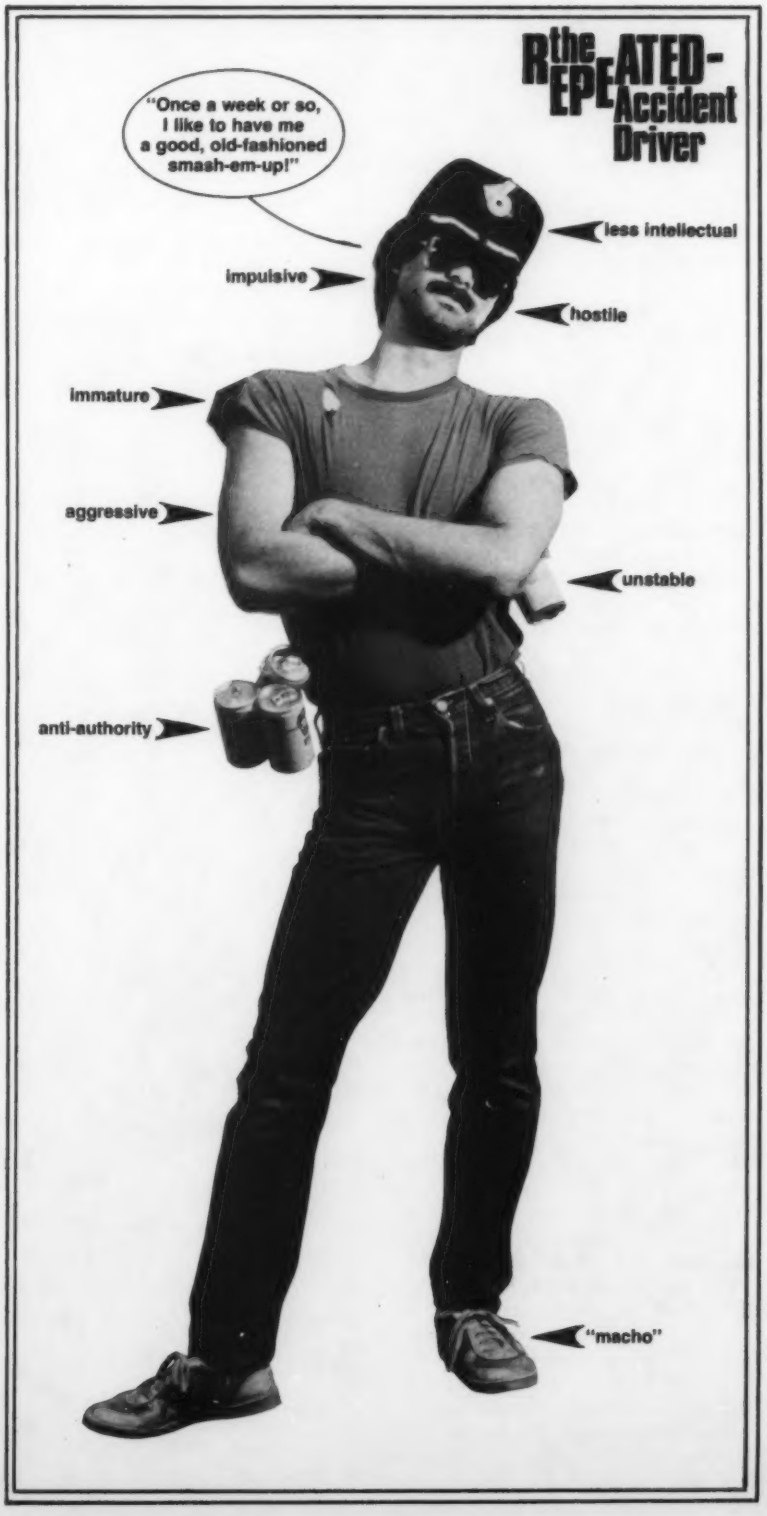
Taxi Driver: Drs. W.A. Tillman and G.E. Hobbs did a study of two groups of drivers in a taxi company in London, Ontario in 1949. They came up with a profile of the high-accident driver, and said he "comes from a home marked by parental divorce and instability. During childhood his life is marked by evidence of instability and disrespect for organized authority. As a result he has often encountered difficulty with the school authority and frequently has been before the Juvenile Court. In adulthood his occupation record is marked by frequent short-term employment and his connections with any firm are frequently terminated by the employer. He has a police record apart from traffic violations much more frequently than those within the low accident group. His personal life is marked by the same evidence of social disregard as noted in the other aspects of his life . . . He is an individual who places all emphasis on material values and who acts only with thought for immediate satisfaction without any concern for tomorrow. His driving is marked by the same tendency of aggressiveness, impulsiveness, and lack of thought for others and the disrespect for authority that was noted in his personal life."

They added, "The high accident group shows marked intolerance for, and aggression against, any authority, dating from early childhood . . . The high accident record is one manifestation of these personality characteristics." (Tillman, 1949)

Tillman's group was thought to be a little extreme, but subsequent studies showed many of the same personality traits in high accident drivers, without so much trouble with the law and social agencies.

The mature driver: Dr. Frederick L. McGuire did a study of some

continued



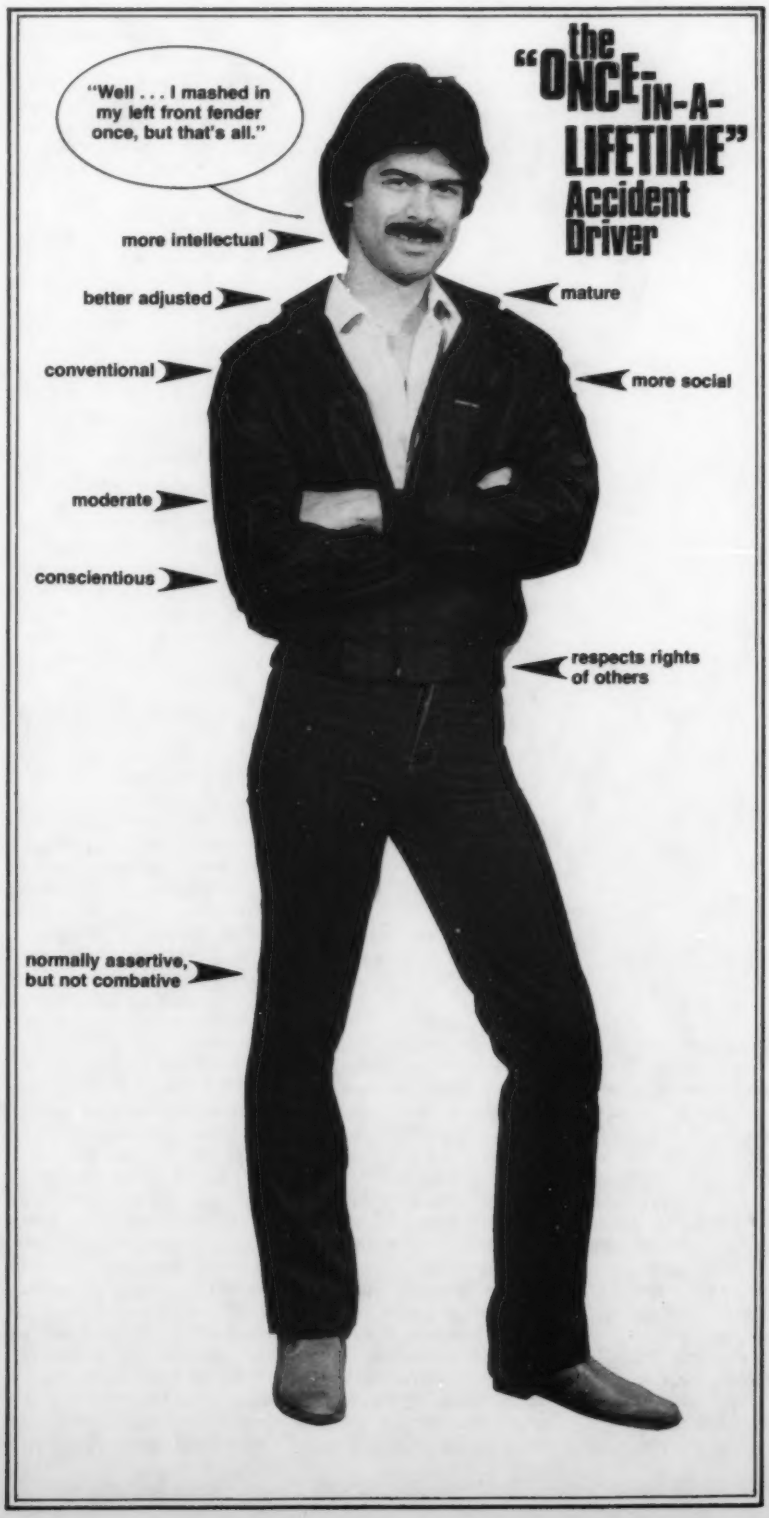
continued

Navy personnel in 1956. He found that the accident- and violation-free driver has the following characteristics: "Is more conservative and moderate in his attitudes" (including less attraction to the use of alcohol), "Is socially more efficient," "Is socially more stable" (including not losing his temper so easily), "Has more mature outlook," "Has different tastes and interest," "Is more conscientious and ambitious," "Had happier childhood," "Has healthier attitude toward law," and "Has healthier attitude toward operating a vehicle on the highway." Significantly, this last area included the statements: "Doesn't believe accidents are mostly due to luck," "Believes a good driver must always pay close attention to his driving," and "Is more willing to share highway with trailer trucks and other vehicles."

McGuire concludes, "The results are what one would expect. For example, we would certainly expect the safe driver to have a healthier attitude toward law. The fact that he is a more responsible person and is more conservative in his use of alcohol also logically fits the picture of a safer driver. The fact that he is more intellectually inclined and more at home with ideas equips him better to understand that traffic signs and laws are the attempt of society to protect itself — to understand that group living requires certain responsible behavior.

"Because driving upon the highway is essentially an interpersonal situation, we would expect that the person who gets along best on the highway also gets along best with people. It is fitting that our accident- and violation-free driving group should bear the earmarks of better adjustment — a smoother home life and more ease in his relations with people." (McGuire 1956)

In another paper, he summed up the high-accident driver this way: "The accident-haver is less mature, less intellectual in his tastes and interests (but not necessarily less intelligent), has a lower aspiration level, expresses 'poorer' attitudes toward the law and driving, is not socially well adjusted, and is the product of a less happy childhood."



He goes on, "The higher the accident frequency, the more likely one is to be aggressive, prestige seeking, and to prefer social roles which are oriented towards authority and/or competition in preference to those which emphasize closeness to people and social service. The likelihood is also higher that the accident-haver has a family history and current family relationships which reflect a higher degree of disruption and conflict." (McGuire, 1976)

X and Y: The two opposite types of individuals were described in a study done in 1959 of two groups of airmen. The non-accident type was called type "x".

"The type x sort of person tends to be rather conventional in his values, attitudes, and behavior. In general, he seems to gain satisfaction for his needs from his everyday life and to have a fairly clear notion of the goals he wants to attain in life and of how to pursue them. He tends generally to have respect for the rights and opinions of other people, and in turn to be pretty well accepted by others. While he may be normally assertive in defending his own rights, he is seldom extremely demanding, domineering or combative."

Sounds like a pretty well-adjusted person. Compare him to the opposite, what the researchers called the type "y" person.

"While there may be a fair amount of individual variation on specific characteristics, in general the type y person tends to be rather unconventional in his opinions and values and sometimes in his overt behavior. He is inclined to be rather self-oriented, to have difficulty in relating easily and warmly to other people, and to be somewhat unaware of, or insensitive to their rights and feelings. He may in some cases feel that other people are difficult to understand. He often has feelings of dissatisfaction about his everyday life and is likely not to have clearly defined goals in life or consistent, practical methods for attaining such goals as he does have. He is apt to have difficulty in controlling his hostility, which may often be excessive, and consequently may at times be inclined toward over-determined "acting-out" behaviour, either at the

continued

ACCIDENT prone

The idea that some people are extremely susceptible to accidents, or "accident-prone," is so popular that it is almost a cliche. However, psychologists have some difficulty identifying these individuals.

Dr. Frederick L. McGuire of the University of California, Irvine, Medical Center, said "There is no such thing as an accident-prone personality, and yet we *have* seen them clinically. They are either klutzes, or have a death wish, or a combination of the two. Accident-proneness is not an enduring trait."

In his paper "A Typology of Accident Proneness," he writes, "The major flaw in the accident-prone concept is the fact that people who have accidents in one period of time are not necessarily those who have accidents in the next. That is, 10 percent of a population may indeed have 90 percent of the accidents during, say, a two-year period, but during the next two years that 10 percent of the population does not include the same individuals . . . .

"However, the nagging fact remains that some people do have more accidents than others . . . . No clinical psychologist or psychiatrist experienced in working with individual patients could ever be convinced by mere theorizing that 'accident-prone' people do not exist.

"Fortunately, these two sources of data are not necessarily contradictory. In fact, together they point to a very likely conclusion, namely, that certain people *are* accident-prone, but sometimes only for short periods of time, and that there are others who are accident-prone over extended periods of time — perhaps for several years or most of their remaining lifetime."

He goes on to explain the different kinds of accident proneness, both short-term and long-term.

Those who are accident-prone for short periods of time are reacting to external pressures. It may be a stress situation — divorce, financial troubles, or other worries — that causes inattentiveness, forgetfulness or hostility to be shown on the road. Or it might be some "transient condition" such as having one's driving ability impaired by illness, adverse reaction to a drug, or fatigue. Once these external pressures or conditions are brought under control, the accident-prone condition may disappear.

Accident proneness over a long period of time is, of course, a more serious problem, caused by "disruptive influences" from inside the person. McGuire breaks these up into three kinds.

The first is character conditions. These persons will be anti-social and anti-authority, and will have no respect for the rights of others. McGuire puts younger accident-prone drivers in this group but says "most of them are reacting 'normally' to a particular state of development," and will change as they mature.

The second is "intra-psychic conditions," neurotic and psychotic people. The symptoms are varied and may include anxiety, depression, inability to concentrate or make decisions, and even disorientation, loss of memory and destructiveness.

The third is physical conditions of a more lasting type than those listed as "transient," including such things as failing eyesight, diabetes, and senility.

So what's the bottom line on this? Whether or not you believe in the concept of "accident-proneness," you must remember that there are indeed times when you are more "prone" to accidents than you are at other times. If you are under a lot of stress, or if you're tired or on medication, or especially if you have a tendency toward being hotheaded, be very careful how you drive.

Maybe even let someone else take the wheel while you're in the hazardous 10 percent of the population.

continued

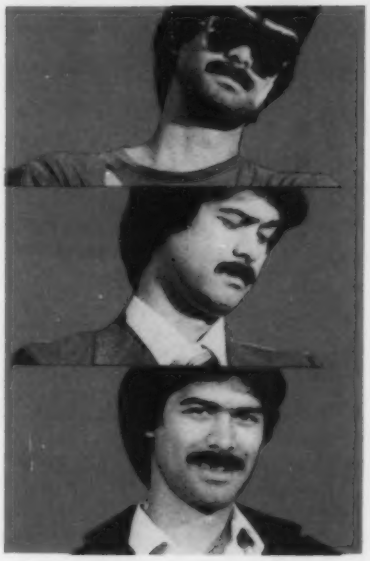
level of overt physical belligerance or at the level of verbal aggression — in the form of sarcasm, carping complaints, or destructive comments. He is likely at times to exercise poor judgment in his evaluation of his environment or in choosing courses of action. In some cases, he may appear overly preoccupied with his own fantasy world and relatively cut-off from social relationships with others." (Conger, et al, 1959)

Macho, etc. How does the less mature and less well-adjusted personality show itself? Here, we want to compare the attitudes of drivers with those of airplane pilots. Embry-Riddle Aeronautical University did a study called "Pilot Judgment Training and Evaluation" for the Federal Aviation Administration. Among the more interesting ideas was the "Five Hazardous Thought Patterns" that pilots are sometimes guilty of and that can contribute to accidents. These can easily be applied to drivers, especially the younger and less experienced ones.

Anti-authority — This thought pattern is found in those who resent it when others have control or authority over them. They ignore rules and regulations in favor of doing it their own way. They can be summed up with the statement "Don't tell *me* what to do!"

Impulsivity — This is the thought pattern of acting on impulse, without first thinking through a situation to explore different possible actions and choosing the best one. Impulsive people do the first thing that they think of. "Do something — now!"

Invulnerability — This is what makes bullets bounce off Superman's



chest. As a thought pattern, it makes people assume nothing bad will happen to them, that accidents will only happen to other people. "Nothing will happen to *me*!"

Macho — This thought pattern causes people to constantly try to prove themselves and impress others by doing dangerous things. It is the drive to gain the attention and approval of people, and it is the idea that caution is for "wimps." It is *not* exclusively a male attitude. "*I* can do it!"

External control — This is the idea of people who think they can do little, if anything, to control situations. It is a fatalistic attitude of "What's the use?" Good things are thought to be just "good luck," and troubles are chalked up to "bad luck" or the fault of another person. "It's out of my hands."

All of these hazardous attitudes are typical of drivers as well as pilots. We won't pass judgment on the reasons pilots think this way, but we think these attitudes in drivers are evidence of the basic problem of immaturity. The ideas show a naive, irresponsible or inexperienced frame of mind.

Responsibility: Dr. Frederick L. McGuire, professor of Medical Psychology at the University of California, Irvine, told us the amount of peoples' social responsibility "shows up in the way they drive. Only a small percentage of 15 to 18-year-olds are responsible and respectful. At age 25 the accident rate drops. That seems to be the age of social responsibility."

Although this is true, there is no reason why drivers can't show such responsibility at a younger age. People are not computers; they are not "programmed" to be a certain kind of driver until age 25 when they magically mature.

Responsibility is a matter of *choice*, not "luck" or how happy one's home life was as a child. Referring back to the quote that began this article, if drivers cause accidents, then they are the most important safety device in the car. The driver can speed on wet streets or he can slow down. He can leave his safety belt on the take-up reel or he can decide to use it. He can drive dangerously enough to cause an accident or he can drive with enough caution to avoid even the accident that someone else causes.

BIBLIOGRAPHY

Berlin, J.I.; Gruber, E.V.; Holmes, C.W.; Jensen, P.K.; Lau, J.R.; Mills, J.W.; and O'Kane, J.M.; Pilot Judgment Training and Evaluation, Department of Transportation, Federal Aviation Administration, Report No. DOT/FAA/CT-82/56-I, 1982.

Conger, John J.; Gaskill, Herbert S.; Glad, Donald D.; Hassel, Linda; Rainey, Robert V.; and Sawrey, William L.; Psychological and Psychophysiological Factors in Motor Vehicle Accidents, *Journal of the American Medical Association*, 1959, 169, 1581-1586.

McGuire, Frederick L.; Psychological Comparison of Automobile Drivers, *U.S. Armed Forces Medical Journal*, 1956, 7, 1741-1748.

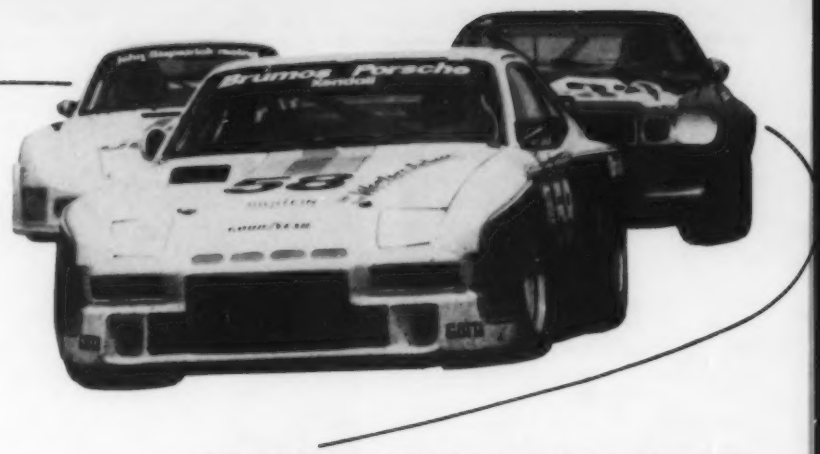
McGuire, F.L.; Suicidal Impulses in the Operation of Motor Vehicles, *Journal of Mississippi State Medical Association*, 1961, 2, 331-334.

McGuire, F.L.; A Typology of Accident Proneness, *Behavioral Research in Highway Safety*, 1970, 1, 26-32.

McGuire, F.L.; Personality factors in Highway Accidents, *Human Factors*, 1976, 18, 433-442.

Tillman, W.A., and Hobbs, G.E.; The Accident-Prone Automobile Driver: A Study of the Psychiatric and Social Background, *American Journal of Psychiatry*, 1949, 106, 321-331.

Cast in the same MOLD



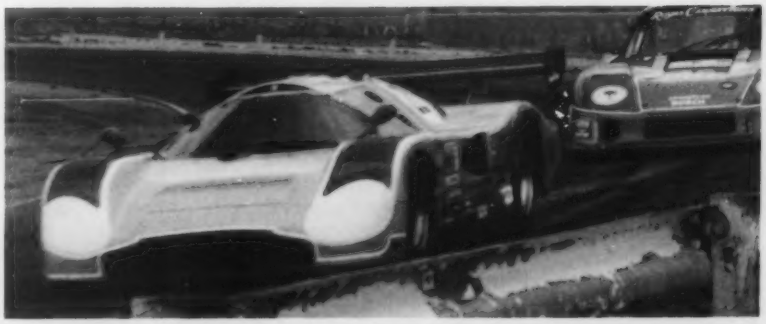
Of the 56 GT cars that started the recent six-hour Los Angeles Times/Datsun Grand Prix of Endurance at Riverside, Calif., these four leading machines all had one thing in common: The team of drivers assigned to each included at least one woman.

Conditions for safe grand touring on highways are remarkably similar to those for race tracks. The vehicles, roads, light, weather, traffic and drivers are cast in the same mold.

VEHICLES: Most GT racing cars start life as street machines such as the BMW M-1, Camaro Z-28, Datsun 280ZX, Mazda RX-7, Porsche 911 and 924, Toyota Celica and the like. Those that weren't originally street machines have to meet certain specifications that make them prototypes of tomorrow's GT cars.

Regardless of their origin. all GT racers have to conform to very strict safety standards to protect drivers at the high speeds involved. The key item in the safety standards is a five-point safety belt system. However, like the three-point unit found in street GT cars, the five-point system is useless unless it is worn properly. And no racing driver would think of turning a wheel without first buckling up. Likewise, no experienced highway driver is going to touch the ignition key without fastening his or her belts.

Vehicle condition also affects the driver's ability to control the car, to see and be seen, and to communicate with other drivers, whether on the street or race track. For the racer, the chances of winning are better with a car in tip-top condition. For the street operator, the chances of staying out of an accident improve when the vehicle doesn't have any operational defects. Major areas of concern to both racer and highway driver are:



Desire Wilson, a South African driver who has won at several types of auto racing including Formula One, shared the #30 March 83G-Porsche with its owner Dr. Gianpiero Moretti. Notice that even while stationary in the pits talking with the mechanics, her five-point safety belts remain fastened.

Kathy Rude, a former instructor at the Bob Bondurant School of High Performance Driving, explains how the #58 Porsche 924 Carrera handles the Riverside curves to her co-driver. Knowing the road and traffic is an important part of driving on both the track and highway.

Deborah Gregg, widow of the International Motor Sports Association's all-time GT winner Peter Gregg, listens to a technical explanation of a problem with her #58 Porsche she shared with Rude. Vehicle condition is just as important to the highway user as it is to the racer.

brakes, tires, lights, windshield wipers and horn.

ROADS: Traditionally, GT races are run on tracks that are either made up of closed public highways such as LeMans, France, or designed to resemble local roads as with the Nurburgring in Germany. Because GT races are not short sprints but long haul events such as the 24 Hours of LeMans, road conditions change constantly. In the same manner any trip on the highway can involve a number of different road conditions.

LIGHT: Because GT races are run around the clock, light conditions change just as often for the racer as they do for street drivers. They must both adjust for too little (night) or too much (heading into a rising or setting sun) light.

WEATHER: Again, GT races are run around the clock without regard for atmospheric hazards. Hazards that highway drivers face in day-to-day driving. Hazards that can affect traction, visibility and vehicle control. Weather hazards such as rain

Lyn St. James, a Ford factory driver who was to share the #22 Aston Martin Nimrod, says "The novelty of being a woman race driver can wear thin real quick if you're not doing the job. To a degree, women will always be a novelty because we will always be a minority in racing. But each person should be accepted, or not, on their own merits."

Margie Smith-Haas, a professional racer who also builds her own cars that can't be driven (they're miniature stuffed replicas), co-drove the #97 Toyota Celica with actor turned racer Gene Hackman. Driving chores are shared in long races just like they should be on extended highway trips.

continued

All the names in GT racing, men and women alike, were overshadowed at the Riverside race by one of the best driver combinations in motorsports history: A.J. Foyt and Mario Andretti. Between them they've won five Indianapolis 500s, the Daytona 500, LeMans and the World Driving Championship. However, all that experience was to no avail when the engine failed in the #09 Moby Dick (long tail) Turbo Porsche 935.

and fog require defensive actions from all drivers — racers and street drivers alike.

TRAFFIC: While racers don't often meet cars going the other direction, they do have to deal with passing, being passed, merging traffic and other conflicts arising from having more than one vehicle on the same road. The racers' real advantages come because it is possible for them to personally know everybody they're sharing the track with and thus be able to anticipate what the other drivers might do.

DRIVERS: Being in top physical, mental and emotional shape allows any driver — racer or street — to adjust to all the other conditions and to errors of other drivers as well.

Racing drivers don't drink and drive, or do drugs and drive. They are objective about their own fitness. And they use their powers of concentration to block out emotions such as anger and worry while behind the wheel. Fatigue and sleepiness are driving hazards that racers avoid by changing drivers regularly.

Similarly, nobody should drink or do drugs and then drive. Likewise, avoid driving when angry, worried, sick or tired.

As a result of the similarities between GT racing and street driving, the lessons accented in racing apply equally to driving on public roads. That is: pay special attention to vehicle, road, light, weather, traffic and driver conditions.

The winning Porsche 935 covered 637 miles in six hours with the driving skills of John Fitzpatrick, David Hobbs and Derek Bell.

NO NICKS, NO CUTS

GM crash-tested this Chevrolet Cavalier equipped with the special Securiflex plastic-coated windshield. The crash dummies' heads cracked the windshield.

The idea is to make a windshield that will reduce the number of facial lacerations in accidents.

General Motors has begun testing cars with special windshields that are coated on the inside with plastic. GM has built 2500 Chevrolet Cavalier and Pontiac 2000 sedans and station wagons with the Securiflex windshields for use in nationwide rental service. As rentals, the cars will provide more and faster information on the durability and scratch resistance of the plastic glazing and any tendancy of the glazing to become hazy, thus reducing visibility.

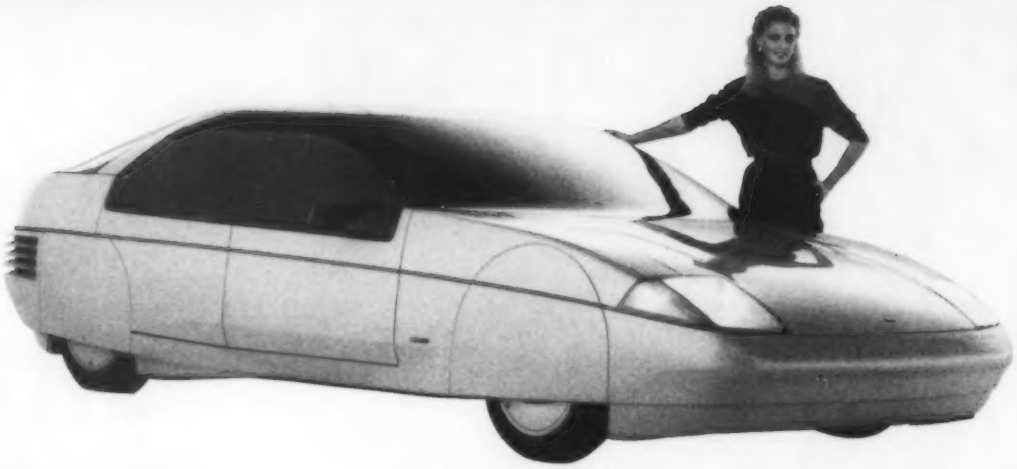
The National Highway Traffic Safety Administration (NHTSA) had to approve the pilot use of the windshields because they do not meet present U.S. requirements for interior surface scratch resistance, although they do meet all other safety standards.

NHTSA is considering a request to change its standard for interior surface abrasion resistance, which would be necessary before the new type of windshields could go into general use in the country. In addition, it would be necessary to establish a manufacturing capacity in this country to produce these windshields. Only one company, Saint-Gobain Vitrage in France, now produces the windshields in Europe, where they are in limited use.

Safety engineers said the introduction of High Penetration Resistance windshields by the U.S. industry in the mid-1960s has all but eliminated extreme, or life-threatening, lacerations from windshields in accidents. Injuries that occur today are usually more cosmetic than life-threatening, and engineers said if these experiment windshields prove satisfactory, they could significantly reduce the chance of even small facial cuts being inflicted by windshields broken in an accident.

GM engineers will monitor the windshields while the cars are in rental service for about a year and continue to follow their performance after that. While plastic glazed windshields have been used in Europe, the engineers said that driving in North America includes a much wider range of temperature, humidity, and dusty conditions, making a test in the U.S. necessary.

The plastic coating on the inside of the windshield prevents sharp glass fragments from scratching and cutting the faces of the occupants.



Probe IV, fourth-generation aerodynamic research car developed by Ford, has a coefficient drag of .15, which is roughly equivalent to that of a jet fighter.

form follows function

Aerodynamics (âr o-di-naḿ iks) *n. Plural in form, used with singular verb. The dynamics . . . of atmospheric interactions with moving objects.*

In car design, aerodynamics means contemporary high styling, dramatic new shapes, fuel efficiency, quieter ride and much more. It can even improve safety.

The direct contributions of aerodynamics to safety come in better handling and stability. But there are also indirect contributions. Because of aerodynamic contributions to fuel economy that are independent of weight, engineers can concentrate on safety-related items that might otherwise be too heavy to put into a standard passenger car.

The basic measure of a vehicle's aerodynamics is its coefficient of drag (Cd). For example a parachute, which has an understandably high drag, has a Cd of 1.35, while a flat surface has a Cd of 1.17. At the other end of the scale are the sphere and airfoil (wing) at .10 and .05 respectfully.

In the American market, current production car Cd values range from .52 to .32.

For years engineers thought that the lowest limit of Cd a car could ever obtain would be .20. However, with recent breakthroughs they are obtaining drag figures previously only associated with jet fighters: .15.

Each .05 reduction in Cd equals a 2.5-mile-per-gallon improvement in fuel economy.

There is an additional, more comprehensive measurement — "aero horsepower." That is the amount of horsepower it takes to overcome the vehicle's air drag at 50 mph on a level highway. While a mid-size car may require about 7.7 aero horsepower, a subcompact can get by with 5.3. By contrast, a heavy-duty truck may require as much as 100 aero horsepower.

The saving of one aero horsepower is the fuel-efficient equivalent of taking 300 pounds of weight out of a car. Weight that can then be used to improve safety features.

Ford Motor Company's Concept 100 is excellent example of the vast array of advances that can be packaged in a car once aerodynamic design is translated into form.

The sleek exterior features new low-profile halogen headlamps with aerodynamic covers, a bronze-tinted glass with compound curvature, a heated windshield and pearlescent paint. Features include satellite navigation; highly sophisticated, colorful instrument-panel displays; Voice Alert and Voice Command; a Remote Convenience system; Keyless Entry and Keyless Ignition; a Sonar Detection system; an entertainment system with remote radio chassis and separate front and rear controls; four-wheel anti-skid brakes; and an electronically controlled air-suspension system.

DRIVER talked about and showed the satellite navigation in the June 1983 article "Alex's Adventures in Motorland." In addition to the satellite navigation maps, the driver can call up six other data and vehicle-control displays including a graphic warning display. A car silhouette has indicators for door ajar and low tire pressure, and has the capability for added warnings.

The "talking car" feature — Voice Alert — uses synthesized speech to tell the driver that a door is ajar, lights are on or the trunk is open, and to warn the driver to check oil pressure, battery-charging system, brake-fluid pressure, windshield-washer fluid or fuel level.

Through a microphone by the steering column, the driver can use a Voice Command system to raise or lower the antenna, turn wipers on (two wipes and they turn off) and turn headlights on or off — all without tak-

The aerodynamic lines of Ford's Continental Concept 100 allowed engineers to assemble the greatest array of functioning advanced electronics ever in one vehicle without suffering fuel mileage penalties.

ing his eyes off the road. The system learns the driver's voice characteristics through a training procedure and uses the stored speech patterns to distinguish a command.

A hand-held transmitter with push-buttoms can be used at distances up to 200 feet to unlatch the driver's door, unlatch both driver's and passengers' doors, blow the horn and flash the light to locate the car in a parking lot, release the trunk lid and turn on courtesy lights. Pressing an emergency button helps warn of intruders by blowing the horn continuously and flashing the lights.

A separate color-coded, rear-projection display to the left of the multi-function cathode ray tube directs the driver's attention to the CRT with three messages: "Caution — See CRT," "Danger — See CRT" or "Service — See CRT." Information displayed on the CRT would include such messages as low fuel level for caution, engine overheating for danger, and a preprogrammed date of mileage interval for service. This Warning Module also incorporates the self-training function for Voice Command.

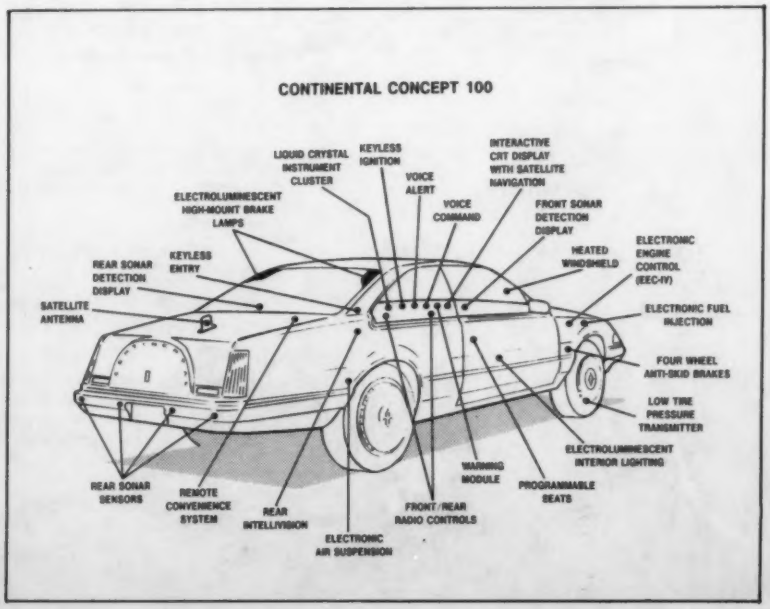
A Sonar Detection system with display panels mounted on the rear package tray and in the instrument panel warns the driver of obstructions in the car's path, such as a small child or a tricycle left in the driveway. The system also makes parking easier — the driver can check the displays to determine the distance between his or her bumper and the car behind or ahead.

In addition to the safety features of Sonar Detection, Voice Alert, Voice Command and warning displays, the Continental Concept 100 has four-wheel anti-skid brakes and an electronically controlled air-suspension system.

The anti-skid brakes provide positive stopping under varying road conditions, and the air-suspension system adapts automatically for both road and load changes.

Additional features include:

- Programmable seats that adjust to any of four positions selected by family members and entered into memory.
- High-mount electroluminescent brake lamps in the rear window.
- Electroluminescent interior lighting, in the doors.
- Steering-column pushbutton controls for such functions as headlights and wipers.
- Automatic day/night mirror, which changes from day to night positions whenever bright lights are aimed at the rear window, then returns to the day position when the bright lights are removed.



...ANOTHER SATISFIED CUSTOMER, CY...
YEAH... SPENT A LOT OF BREAD, TOO. NEW BIKE... NEW HELMET... NEW LEATHERS... SAID IT WAS HIS SEVERANCE PAY...
WHERE'S THE CHICK HE CAME IN WITH?
DANCIN' IN THE DISCO. SHE BOUGHT SOME THREADS AT BOO-BOO'S AND TOLD HER BOYFRIEND TO GET LOST.
...WEIRD COUPLE. CAME IN HERE WEARIN' NOTHIN' BUT A SMILE AND A FIG LEAF...
CY'S CYCLE City & DISCO
LOANS
BOO-BOO'S BOUTIQUE
DISCO! ..Fui!
WOOPS
BECAUSE I'M A SMART RITTLE NEATGUY, I CAN SEE YOU DON'T KNOW NOTHIN' ABOUT RIDIN' MOTORSIKKRES IN THE TWIRIGHT. JUST RET ME BAY THAT THIS TIME OF DAY IS THE WORST TIME FOR EVER'BODY - BIKERS AND MOTORISTS! RIKE, MAN, YOU CAN'T SEE RIGHT! IF YOU THINK BIKERS HAVE IT ROUGH IN THE DAYTIME WHEN MOTORISTS CAN SEE US BUT DON'T, EVENING IS REARRY ROUSY! IN THE EVENING THEY DON'T EVEN SEE EACH OTHER!
AND THERE SU TH
WHAT DO THEY DO? WHAT DO THEY DO?
FOR OPENERS, THEY DRINK A ROT.
...RIKE, THEY STOP ON THEIR WAY HOME FOR JUST "ONE"
ONE DRINK, O DRINK, ONE D ONE ACCIDE
BUT DON'T TAKE MY WORD FOR IT... RISTEN TO IT FROM THEIR OWN RIPS!
"I WAS IN A BIG HURRY TO GET HOME AND DROVE TOO FAST FOR (OUCH!) CONDITIONS." ...E.T.
35mph
50mph
60mph
zero
"I WAS BRINGIN' MY PROBLEMS HOME FROM THE OFFICE." ...G.R.R.
"I THOUGHT IT WAS STILL DAYTIME AND (HEH! HEH!) FORGOT T' TAKE OFF M' SUNGLASSES." ...U.C.
"I WUZ CRAW FIEND IN A CH I'D ALMOST
"WORKED HARD ALL DAY AND (YAWN) WAS TOO SLEEPY TO (YAWN) DRIVE ...BUT I DID." ...I.

Evening
OPS!
WHAT HAPPENED?
NIGHT'S COMIN' DOWN IS WHAT HAPPENED. DAY IS DONE AND YOU'RE BIKIN' IN THE DUSK IS WHAT HAPPENED. YOU JUST RAN INTO SUNDOWN...
BUMP!
WHO YOU?
MAN, I'M THE OLD RAMP RIDER AND I'M GONNA RIGHT YOUR RAMP OF SMARTS...
EVER SPEND ANY TIME IN JAPAN?
JUST PIPE DOWN AND RISTEN! WHAT'S YOUR NAME?
ADAM.
HERRO, ADAM.
AND THEN HERE'S THE SUNSET THING...
K, ONE MORE NE DRUNK, CIDENT.
... WHEN YOU CAN'T SEE ON-COMING TRAFFIC BECAUSE THE SETTING SUN IS IN YOUR EYES...
HONK! HONK!
LOOK OUT!
HONK!
OR, ON-COMING TRAFFIC CAN'T SEE YOU BECAUSE THE SETTING SUN IS IN THEIR EYES! MAN, THAT'S A REAL RURD!
HONK! HONK!
HONK!
ROOK OUT!
WHAT ELSE?
ROTS OF THINGS! RIKE THE TURKEYS WHO DON'T TURN ON THEIR HEADRIGHTS.
OR THE ONES WHO USE THE WRONG RIGHTS.
YOU KNOW... PARKING RIGHTS INSTEAD OF HEADRIGHTS.
AT TWIRIGHT, THOSE DINKY PARKING RIGHTS MAKE A CAR ROOK RIKE IT'S WAY DOWN THE ROAD WHEN IT'S REARRY RIGHT ON TOP OF YOU.
NNIN' HOME FER DINNER WHEN ONTA ME. HE RAN I GOT HOME... SPINACH! YUK! ... K.I.D.
C RAWLIN' HOME FROM THE (HIC!) BAR WHEN THIS A (HIC!) PICKUP RAN OVER MY GREAT TOE. AND MOST MADE IT TO THE DRIVEWAY... CHEERS." ... L.U.S.H.
DAY OD DRIVE...
OLD RAMP RIDER, YOU SURE TALK FUNNY FOR SOMEBODY FROM AROUND THESE PARTS. WHERE YOU REALLY FROM? TOKYO? OSAKA?
BORN AND RAISED IN BOISE, KID. BUT BIKIN' IN THE TWIRIGHT HAS SCARED THE "L'S" OUTTA ME...
... MUST BE REALLY ROTTEN WHEN THE WEATHER'S BAD.
YOU WOULDN'T BERIEVE IT... IT MAKES STRONG MEN WEEP...
NOW, THIS BRACK STUFF IS "NIGHT", BUT THAT'S ANOTHER STORY.

DRIVER INTERVIEWS HEAD OF rah*

*RIDERS AGAINST HELMETS

EDITOR'S NOTE: Although this interview never actually took place, it could have. The responses by the head of the mythical R.A.H. represent ideas asserted as facts by many anti-helmet people. These people often drop their "facts" into conversations and letters. Some of the names have been changed to protect the innocent. Any resemblence to persons portrayed herein and actual persons, living or dead, is a crying shame.

DRIVER: Staff Sergeant — would you please give us a short history of the Riders Against Helmets organization?
HEAD: RAH-RAH?
DRIVER: Rah-rah? That's an awfully short history.
HEAD: No, RAH-RAH is what we call ourselves. You know, Riders Against Helmets: R-A-H; RAH!
DRIVER: But that's only one rah; why do you say rah-rah?
HEAD: Sometimes we say RAH-RAH-RAH or — oh, what the heck, you'll understand better as we go along. What was the question again?
DRIVER: I asked for a short history of RAH.
HEAD: Well, we started in the mid-60's

when the Department of Transportation told the states if they didn't enact the helmet law they would lose some highway funds.

DRIVER: And all but three states passed helmet laws.

HEAD: Are you telling this story, or am I?

DRIVER: OK. How effective were the helmet laws?

HEAD: I'd rather not say.

DRIVER: But you promised not to be evasive.

HEAD: Oh, I think I forgot the figures.

DRIVER: Will you please tell us what happened when 40 helmet laws became effective between 1966 and 1969?

Although any helmet is better than no helmet in an accident, they are actually designed and constructed for specific uses. For example, the helmet at the top of the page was developed for all-terrain vehicle riders. It's lighter than a motorcycle helmet with a larger face opening and more ventilation. In contrast the helmet above is a premium helmet for the serious rider who requires the best.

HEAD: You promise not to spread it around?

DRIVER: We promise. What happened?

HEAD: Well, deaths per 10,000 registered motorcycles fell from nearly 13 to eight.

DRIVER: An almost 40 percent reduction in deaths!

HEAD: Hey, you're a regular mathematical genius.

DRIVER: Sarcasm won't help. Tell us more about RAH.

HEAD: Just about the time all the states gave in, California took the Federal government to court over the issue. You see, California got back less from the government than they paid in. California won the case and many states repealed the laws which had been forced upon them.

DRIVER: How many states repealed their laws?

HEAD: There were 27 states that repealed or weakened helmet laws between 1976 and 1979.

DRIVER: With what results?

HEAD: Ahhhh.

DRIVER: Come now, Sergeant — .

HEAD: Why not call me by my first name, Phynque?

DRIVER: Don't change the subject, Phynque. What happened to the figures when those 27 states repealed or weakened their laws?

HEAD: The fatalities per 10,000 motorcycles went from less than seven in '74, '75 and '76 to nearly 10 by 1979.

DRIVER: Almost a 50 percent jump.

HEAD: What you got, a calculator for a tongue?

DRIVER: Could we get back to RAH's history?

HEAD: Now, also playing into this was the head of DOT who tried to enlist the aid of motorcycle manufacturers. The makers of Harley-Davidson agreed that helmets were good, but that the government did not have the right to make people wear them.

Well, we were just about to look for something else to be against when a new surge of helmet laws came again in the late '70s, led by Joan Claybrook who was then the head of DOT. She had never ridden a motorcycle but had written a book called "Murdercycles."

DRIVER: Hold it right there, Phynque. Claybrook headed the National Highway Traffic Safety Administration from '77 until '80, not DOT.

HEAD: Same difference.

DRIVER: Maybe the difference between DOT and NHTSA doesn't matter to you, but the years you say Claybrook was pushing for new helmet laws are also the years you say states were cutting back.

HEAD: Yah, so?

DRIVER: How can you say that?

HEAD: Yah, so? It's easy: Yah, so?

DRIVER: Please be serious, Phynque. Besides Patricia Zonker wrote "Murdercycles," not Joan Claybrook.

HEAD: Either way. Either way.

DRIVER: I think you're a chauvinist.

HEAD: Can I continue with RAH's history?

DRIVER: Do we have a choice?

HEAD: Once again she tried to enlist the

continued

continued

aid of motorcycle manufacturers, only this time she had a very heavy sword in her hands. At the time of her helmet push, the big four Japanese producers were in court involving unfair business practices in the American market, a suit filed by the owners of Harley-Davidson. When Ms. Claybrook tried to enlist the aid of H-D, they gave her the same answer as in the mid-60s.

Shortly thereafter Ms. Claybrook took a trip to Japan where it is reported that she spoke with the representatives of the big four and told them if they did not support helmet legislation that she would see that their court case would go against them.

Results: Ms. Claybrook's legislation picked up momentum. Harley-Davidson lost their case, and the Japanese support helmet laws.

DRIVER: Who *reported* this?

HEAD: A friend of mine. And he should know. He's got a friend who sweeps out the service stalls of a duo Harley-Japanese bike dealership.

DRIVER: You don't think it's possible the Japanese support helmet laws because it's part of their nature to believe in hard-hitting laws?

HEAD: (Expletive Deleted!)

DRIVER: And what do you have to say about the recent jump in large motorcycle import tariff from four to 49 percent for the protection of Harley-Davidson?

HEAD: It's a smoke screen to keep us from seeing the coming of a new helmet law tidal wave.

DRIVER: Come now, Phynque.

HEAD: Well, I got proof because the Japanese produce over 63 percent of the helmets worn in this country.

DRIVER: Not even close. Helmet industry figures show that the Japanese sell less than 20 percent of the helmets bought each year in this country.

And now it's our turn to say "so what" even if they did make 63 percent of the helmets, which they don't. If the Japanese helmets meet the current standards then they have to be just as safe as helmets made in California or Kansas. Besides, a motorcycle accident researcher, Dr. Harry Hurt, says *any* helmet is better than *no* helmet.

HEAD: Don't confuse me with facts. I got my own facts.

DRIVER: Such as?

HEAD: Fact: Of the top 10 states with the lowest fatality rates, the top nine states are those without helmet laws.

DRIVER: Wrong. Of the top 10 states with the lowest fatality rates per 10,000 registered motorcycles in 1981, three had helmet laws.

HEAD: I was talking about deaths per 100 motorcycle accidents.

DRIVER: Then you're really wrong. Of the ten states with the lowest fatality rates per 100 motorcycle accidents during 1981, half have helmet laws. Of the top five, four have helmet laws and the one that doesn't is so far north it hardly has a riding season to begin with. But these facts prove nothing taken by themselves.

HEAD: Well then, try this fact: The states which repealed the helmet law and had an increase of fatalities, also had a larger corresponding increase with motorcycle registration.

DRIVER: I'm not going to argue numbers with you any more. You can't take numbers like you're quoting and let them stand alone.

At the same time some states were repealing their helmet laws they were also increasing other safety programs and enacting tougher drunk driving laws. You just can't compare rates without also comparing driver and rider education programs, the length of the riding season, vehicle miles traveled, size, weight and horsepower of the motorcycles, number of riders per motorcycle, as well as type of roads and weather. Several factors have to be considered before any concrete conclusions can be drawn.

HEAD: Well here's a fact that you can't argue with: Helmets reduce peripheral vision to such a point that if your normal vision was that bad, you could not qualify for a car license.

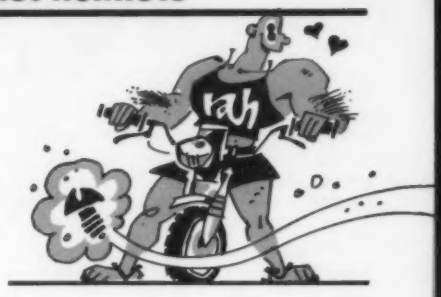
DRIVER: Wrong again, Phynque. Peripheral vision laws usually specify vision of 140 degrees total. The minimum requirement for certified helmets is 210 degrees, with most manufacturers providing helmets with 220 to 235 degrees from side to side. Sunglasses are more restrictive.

HEAD: Well, I know this fact is for real: In 1000 car accidents versus 1000 motorcycle accidents, more people die from head injuries in the cars than on the bikes.

DRIVER: Absolutely not. Besides you're mixing apples and oranges again. While the rates for head injuries — not deaths — are fairly close, the simple use of safety belts would greatly reduce the auto-related head injuries. And if car passengers wore helmets and belts there would be absolutely no comparison.

HEAD: Here's a hard fact: Only one helmet passes the DOT requirement of 100 foot-pounds by the letter of the law.

DRIVER: A helmet that doesn't meet *all* the DOT standards can't have a DOT sticker on it. Besides the more than $800,000 in civil penalties that would have to be paid by a manufacturer of a helmet that didn't meet the requirements, the possible product liability suits would be



staggering. No helmet manufacturer is fool enough to sell helmets that don't meet the DOT standards.

HEAD: This fact says it all: Most people who die of head-related injuries also have multiple body injuries that would have killed them had they been wearing a helmet or not.

DRIVER: The only part of your fact that is correct is that most motorcycle accident victims do have multiple injuries. The typical rider or passenger receives between three and four injuries in a motorcycle accident. Of the body injuries, less than half a percent are fatally severe, yet three percent of the head injuries are severe enough to be fatal. In other words, a head injury is seven and a half times more likely to be fatal.

HEAD: But —

DRIVER: Let me finish this one first. If you compare helmeted accident victims with those who weren't wearing helmets you'll find that the injuries are pretty much the same until you get to the head. Of the helmeted motorcycle riders in accidents, 24 percent had arm injuries, while 21 percent of the unhelmeted riders had arm injuries. For legs it was 42 percent of the helmeted versus 35 percent of the unhelmeted riders. As for the torso, 20 percent of the helmeted had such injuries while 19 percent of the unhelmeted riders were injured in that area.

Of the helmeted riders involved in accidents, only 13 percent had head injuries. On the other head — to coin a phrase — one in every four of the unhelmeted riders suffered head injuries. That's 25 percent, or nearly double the helmeted rate.

Another interesting figure is that while more than half of all riders wear helmets in non-law states, only 40 percent of all riders involved in accidents are wearing helmets. And only 20 percent of all fatalities are wearing helmets.

HEAD: Bah! I bet this fact will put you in your place: The temperature in a helmet is five to 15 degrees higher than normal. This causes heat-related injuries during summer months.

DRIVER: Nonsense. A helmet is the perfect insulation, keeping the head warmer in the winter and cooler in the summer.

HEAD: Well, since you like numbers so

much, you'll love this fact: A helmet has only 1/2000th of a second "skid" before it "grabs" the pavement.

DRIVER: If your numbers were any where near correct — which they aren't — I might like them, but I certainly wouldn't love them.

No matter what the actual skid-to-grab duration time of a helmet is, it has to be better than the skid-to-grab time of a human head.

Now to the real truth of the matter: One of the greatest advantages of a helmet is its ability to slide without grabbing. And even after the outside of the helmet has grabbed and stopped, the head inside is still moving as the helmet does its job of cushioning the impact.

In fact, in the DOT standards there are dwell time requirements that range from two to four milliseconds. Two milliseconds is four times longer than the time you mentioned; four milliseconds is, of course, eight times longer than your figure.

HEAD: This next fact is cold and hard. Fact: It is determined that the bouncing of the helmet upon pavement during an accident has broken more necks than it has saved skulls.

DRIVER: Trash. If anything, helmets reduce neck injuries. In Dr. Hurt's studies, riders who weren't wearing helmets had 75 percent more severe neck injuries than those who were wearing helmets. That means you're nearly twice as likely to get a severe neck injury in an accident by *not* wearing a helmet than by wearing one.

HEAD: Well then, I've got you on this next one. Fact: During contact with pavement in which a helmet breaks and the skull is fractured, the helmet liner holds in blood and pressure and kills drivers, where a free bleeding wound would not have resulted in death.

DRIVER: You're making these up as you go along, aren't you?

HEAD: No way, these are known facts.

DRIVER: Sure they are. But let's examine your "fact" an item at a time.

First of all, if the force was enough to destroy the helmet it probably would have killed an unprotected rider outright. Second, no helmet fits tight enough to stop bleeding, especially if it's broken.

Third, if the bleeding was from a surface wound then the pressure and holding in of the blood would be ideal first aid. However, if we're talking about bleeding in the brain area; it's probably going to be fatal either way.

That "fact" doesn't hold up under any light.

HEAD: You may be right, but in the end it doesn't matter because it is the car drivers that get you. Fact: Seven point three out of 10 accidents are the car driver's fault.

DRIVER: You're saying that 73 percent of all motorcycle accidents are caused by car drivers?

HEAD: You finally got a fact right.

DRIVER: No, you got another one wrong. If your "fact" was correct, all but one percent of all multi-vehicle accidents would be the fault of the other vehicle operator. You see, 26 percent of the motorcycle accidents are single-vehicle mishaps. Granted, 13 percent of these are caused by other vehicles. Of the multiple-vehicle accidents, 65 percent are the fault of the other vehicle's driver.

In the end, only 51 percent of all motorcycle accidents are caused by other drivers. In the Air Force, almost all fatal motorcycle accidents are the fault of the cycle operator.

HEAD: I suppose you think you've shot down all my facts?

DRIVER: You mean you don't have any more "facts" such as "Helmets impair hearing?"

HEAD: They do? I mean, *they do*.

DRIVER: Not to the point of being a hazard. A motorcyclist wearing a helmet can probably hear as well as, or better than, a driver in a car with windows rolled up. In fact, helmets help cut down on wind noise. As a result any rider wearing a helmet can probably hear any other sound that is louder than the motorcycle itself as well as a rider who doesn't wear a helmet.

HEAD: You think you're pretty smart, don't you?

DRIVER: I think I've replied honestly to all your "facts." Have you changed your mind about any or all of them being real "facts?"

HEAD: Of course not. You know what they say, "You can please some of the people some of the time."

DRIVER: I think the expression is "You can *fool* some of the people . . ."

HEAD: There's always a few soreheads.

DRIVER: Can I ask you one last question?

HEAD: Sure, shoot.

DRIVER: Have you ever had a motorcycle accident?

HEAD: Two. How about you?

DRIVER: Several while racing, but only one on the street.

HEAD: Imagine that.

DRIVER: Were you wearing a helmet in either of your accidents?

HEAD: No. Were you?

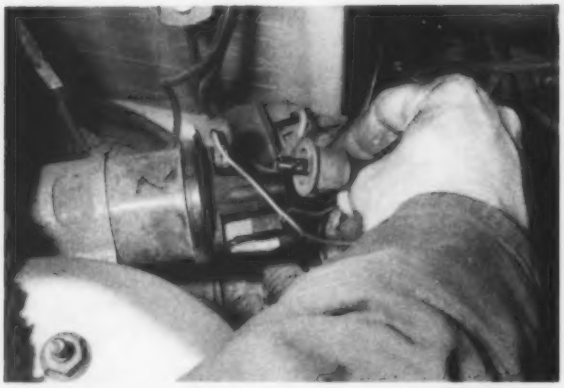
DRIVER: I wouldn't ride a motorcycle without one. By the way, did you hit or hurt your head in either accident?

HEAD: I don't remember.

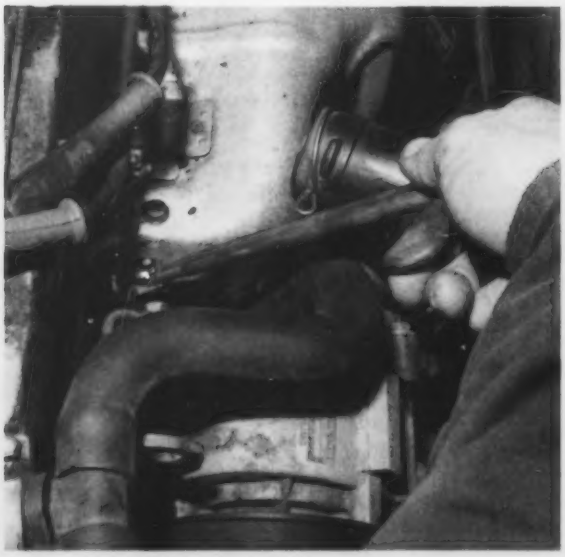
DRIVER: That explains a lot doesn't it?

HEAD: ???

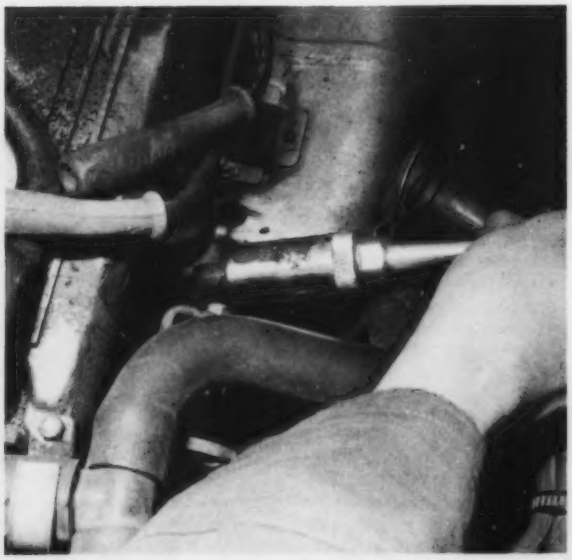
A vacuum gauge gives an instant engine analysis. A healthy engine pulls a steady 17 to 22 inches of vacuum.



Anytime you are going to crank the engine but you don't want it to start, the coil high-tension cable must be removed from the coil or distributor and grounded.



If you don't have compressed air for blowing dirt out of the spark plug ports, use a straw and your lungs.



(left and above)
A spark plug wrench makes spark plug removal easier. However, if you don't have one you can put a section of garden hose over the insulator for easier removal once you've loosened the plug.

THE THREE-PART

2 1/3 Gasoline ENGINE Tuneup

Testing

Your car is going to operate at its best when tuned properly to the manufacturer's specifications. Therefore, the best way to maximize your car's mileage and performance is to give it a thorough tuneup annually or every 15,000 miles if you drive more than that each year.

The average tuneup improves fuel economy 11.7 percent and will pay for itself in 7000 miles — 2500 if you do the work yourself. So instead of waiting for a noticeable drop in your mileage, rough idling, hesitation, dieseling, hard starting, stalling, surging, pinging, misfire or lack of power, you should tune your car regularly as a preventive maintenance step.

In the first part (June 1983) of this three-part series the Backyard Mechanic inspected the battery, replaced the air and fuel filters, checked the emissions control systems, cleaned and examined the spark plug wires, and cleaned the carburetor. Also discussed in the first part of the series was the importance of having a good workshop manual for your specific vehicle as well as reading the entire tuneup section before tackling the job.

In this month's installment you are going to check the engine's internal condition before beginning the actual tuneup. After all, tuning a malfunctioning engine is a waste of time and money and will do nothing to improve mileage, performance or emissions. The internal engine checks are done by testing vacuum and compression.

A $10 vacuum gauge can help you diagnose more than 30 different engine problems from sticking valves to poor rings, including bad carburetor adjustments and a leaky head gasket. Since specific engine problems affect manifold vacuum in certain ways, the gauge can be used to accurately diagnose the condition of an engine by measuring the amount and condition of vacuum.

To provide this measure and condition report, the vacuum gauge must be hooked up correctly. You can't just pull any vacuum line and attach the instrument. Accurate, reliable readings can be obtained only from primary manifold vacuum sources.

On older vehicles with vacuum-operated windshield wipers, remove the wiper system vacuum hose at the intake manifold and attach the gauge hose. Many vehicles have a threaded plug in the intake manifold that can be removed and a special fitting installed to attach the gauge to. If there isn't a manifold source to attach the gauge hose to, put a T-fitting in the vacuum line to the power brake unit or vacuum assist on disk brake-equipped cars.

For best results, always attach the gauge as close to the vacuum source as possible.

To check the engine's vacuum, warm the engine up to operating temperature. At idle a healthy engine will give a steady, constant reading of 17 to 22 units (inches of Mercury), although some newer four- and six-cylinder models deliver acceptable performance as low as 15 points. Also, a slight flicker of the needle can be expected with high-performance engines. There is a drop of one inch for each 1,000 feet above sea level.

The engine that gives a steady vacuum reading at idle, with the needle dropping toward zero and jumping back past 20 when the throttle is opened and closed quickly, is in good condition. Anything else can spell trouble.

For example, if the reading is fairly steady but two inches lower than normal there can be several problems. One might be that the engine isn't fully warmed up. Another could be that the engine oil is too heavy. Other problems that cause this lower than normal steady reading include late valve timing, late ignition timing or intake manifold leaks.

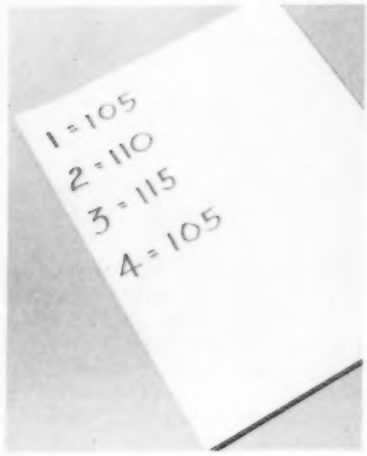
If the steady reading is three to four inches lower than normal, open and close the throttle rapidly. If the needle sinks and then soars the piston rings are leaking.

Steady readings that are extremely low can be caused by a cracked or warped intake manifold, or a very bad carburetor to manifold gasket. Such readings can be as much as 15 units low.

If the needle alternately drops four to five points and then returns to normal you've got a sticking valve(s). Should the point alternately fall more than five units before returning to normal you're facing a burned valve(s).

continued

A remote starter switch helps make quick work of doing compression checks.



Record the highest compression reading from each cylinder and then compare them to be sure that they are within the specifications.

A box with holes punched into it makes an excellent spark plug holder. Although this box was made for eight-cylinder engines, it works equally well for four-cylinder models and can be used for sixes both straight and vee-design.

Examine the plugs at the firing end to learn how each cylinder has been performing during the past year or 15,000 miles.

2 1/3 Gasoline ENGINE Tuneup

A needle that fluctuates with a rhythm is telling you that there's a problem with only one cylinder. The problem could be a fouled spark plug, burned valve seat, blown head gasket, cracked distributor cap, distributor cap tracking or any number of things that affect only one cylinder.

A wavering, irregular needle tells you that the problem is affecting more than one cylinder. Again, there are a number of things that can cause this condition. They include: a poorly adjusted carburetor, a high float level, a distributor shaft or bushing, distributor advance control mechanism trouble, excessive spark timing advance or retard, unsynchronized dual ignition points, too wide a spark plug gap, or poorly seating intake valves.

To help you pinpoint what a needle that sweeps or wanders erratically through several inches of vacuum is trying to tell you, up the engine speed to about 2000 rpm.

If the pointer steadies, check the ignition system, timing and carburetor mixture adjustment at idle — all things you'll be doing in part three of this basic tuneup next month. However, you don't want to overlook the possibility of the problem coming from worn valve guide stems.

Should the sweeps become even larger at 2000 rpm the problem may be weak or broken valve springs. However, if the sweeps are shorter but more rapid, the problem could be either sticky valves or an induction system leak.

A needle that vibrates excessively at all engine speeds is pointing toward a leaking head gasket.

If at a steady 2000 rpm the needle drops slowly toward zero there is an exhaust system restriction.

Should there be no wide sweeps in the amount of vacuum when you suddenly open and close the throttle, you could have an intake leak (gaskets, valve seats, etc.)

Any time you suspect an external leak is causing a problem, squirt some oil where you think the leak might be. Then check the vacuum reading again. If the oil temporarily seals the leak, the readings will improve.

For the compression test you must first remove all the spark plug wires one at a time. Be careful to label each so that it can be returned to its proper cylinder. One way to label the cables is with numbered tapes. Another labeling method is to mark numbers on clip-type clothespins and attach them to each wire.

If you don't have a spark plug cable remover, grip the boot — and only the boot — by hand being careful not to burn yourself on nearby manifolds. Then twist the boot back and forth until it "pops" signaling that it's lost its grip on the plug. Then pull the boot off the spark plug. Never pull on the cables.

Before removing the spark plugs, clean any dirt particles out of the ports. If you don't have compressed air to do this with, blow the dirt out

A spark plug's gap is correct if there is a slight drag on the proper size wire of the gauge.

To adjust the gap, use the notched adjuster on the gauge body to bend the curved side electrode slightly.

with a straw. Be sure to wear some kind of eye protection while doing this.

Now you can remove the spark plugs, but be careful to keep them in order. A cardboard box with holes punched into it numbered according to engine position makes an excellent holder for the plugs.

Now remove the coil high-tension cable from the distributor and ground it to the engine block. Also block the throttle and choke wide open.

If you're going to be using a remote starter switch on a General Motors vehicle having a High Energy Ignition (HEI) you've got different disconnections to make. On V-6 and V-8 HEIs, disconnect the primary wire from the "Bat" terminal on the distributor cap. In-line six-cylinder and four-cylinder HEIs require removal of the high tension coil wire from the coil secondary terminal. Then connect a jumper wire between the coil secondary terminal and a good ground on the engine. On those GM HEIs with an engine electrical diagnostic connector, run a jumper wire from the #6 space on the electronic diagnostic connector to an engine ground.

The remote starter switch is a good idea because it allows you to crank the engine without the assistance of a friend behind the wheel. However, you must be careful to disconnect the correct leads and make doubly sure the transmission is in "park" or "neutral" with the emergency brake set and the wheels chocked.

Normally, the remote starter switch is connected to the solenoid or starter relay with one lead on the battery side and the other on the terminal usually marked "S." However, on GM vehicles with the engine electrical diagnostic connector, the leads must be adapted to terminals #1 and #8.

Also, turn the ignition switch on before using the remote control starter switch. If the vehicle is equipped with a "HOT" indicator, the lamp test circuit is usually built into the ignition system and may be damaged if the engine is cranked with the ignition off.

With the compression gauge in the number one cylinder spark plug hole, crank the engine over for at least four compression strokes (this could take as long as 20 seconds). The compression should build up quickly.

After recording the highest reading obtained, repeat the procedure on the remaining cylinders. Now compare the results with the specifications in your workshop manual. The readings should be relatively close and your manual will tell you how much variance is allowed. The variance will either be stated as a percentage or in actual pounds per square inch (psi). The range is usually between 10 and 30 percent.

For example, the manual may say that the compression pressure should be 140 psi with a maximum variation of 20 psi. That means that if the highest reading you get is 140, the lowest shouldn't be less than 120. Likewise, the manual may call for a 150 psi with a 25 percent variance. In this case if the highest reading was 150 psi, the lowest acceptable reading for any of the other cylinders would be 112.5 psi.

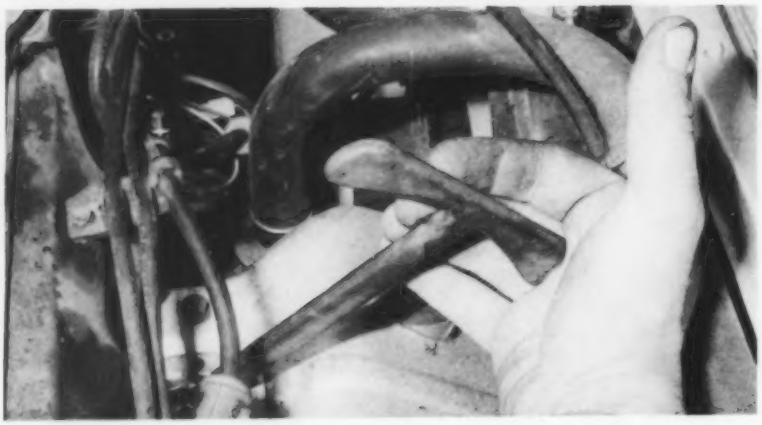
If the difference between the lowest and highest readings is greater than that allowed, then you'll have to assume that the valves, rings, pistons and/or cylinders are damaged. Consequently, there's no sense in doing the tuneup until the internal problem has been cleared up.

If the two low-reading cylinders are side-by-side, there's a good chance that the head gasket is blown. A quick check of the clyinders will probably show that they have water and/or oil in them. There may also be water in the crankcase oil and/or oil and air bubbles in the radiator.

Low compression on the first stroke that builds on the following strokes but doesn't reach specifications indicates worn piston rings. However, a low reading on the first stroke that doesn't build up during the following strokes points to valves that are leaking or a blown head gasket.

continued

continued



Once the spark plug is installed finger tight, a quarter-turn of the wrench will properly tighten it if it has a gasket. If the plug is designed to work without a gasket, 1/16th of a turn will be right.

2 1/3 Gasoline ENGINE Tuneup

To figure out if it's the rings or valves for sure, pour a teaspoon of engine oil into the affected cylinder(s). A squirt can work great for this. Then repeat the compression test. If the compression increases 10 psi or more after the oil if added, the piston rings are definitely worn. If there's no significant increase, the leakage is at the valves or head gasket.

Should the compression pressure be considerably higher than specified, the combustion chamber is probably coated with carbon (has the car been pinging or dieseling?). The cylinder head(s) should be removed and the carbon deposits scraped off.

If the compression varies greatly between cylinders or is way down, you should take the car to a reputable automotive repair shop for a "leak-down" test to pinpoint exactly where the leakage is and what can be done to repair it.

Now let's check those spark plugs that you carefully kept in order. They'll also tell you a lot about how each cylinder has been performing.

Plugs that have a crumbly chocolate-brown or grey-brown deposit lightly coating the core nose indicate normal engine operation.

However, spark plugs with a dry, black, sooty deposit are being carbon fouled. The engine is running too rich. Check the carburetor mixture settings, float level and choke operation. You should have already taken care of one of the major causes of carbon fouling by replacing the dirty air filter.

If a plug is black, wet and oily, it is either burning too cold or oil is leaking into the combustion chamber and fouling it. Oil fouling is common in older engines with worn piston rings.

On the other hand, if the electrodes appear glazed and the core nose looks to be white with very few deposits, the cylinder is burning too hot. The plug could be too hot, the ignition timing wrong, your fuel octane too low or the fuel mixture too lean.

Pre-ignition and overheating can actually melt the plugs' electrodes. However, if the core has been damaged you should suspect pre-ignition or the wrong gap-setting techniques. Check the ignition timing, cooling system, fuel octane rating and fuel mixture.

While normal burning plugs and those that have been oil or carbon fouled can be cleaned and reused, it is really better to install new spark plugs at tune-up time. It is important that you buy the correct spark plugs for your engine. For this information check the tune-up decal in your engine compartment or your workshop manual.

At the same time it is important to keep in mind what the old plugs told you about the engine's running condition. If the old plugs were oil-fouled you'll have to purchase hotter spark plugs. If they were burning too hot, then you'll have to get colder ones. This is one of those times when the counter personnel at an auto parts store can be helpful.

If you want to reuse old plugs you must first open the gap an additional .010 to .015-inch with a gap tool. (The gap grows about .001-inch every 1000

miles.) Then spray the firing end with a solvent to dilute oily deposits. Now clean the electrodes and insulator with a blast from an air gun. The results should be a dry firing end.

Using a high-pressure abrasive-compound cleaner, rotate the plug to provide a thorough cleaning. After several rotations, examine the firing end and repeat the process until all the contaminants are removed. Now air blast the shell bore with high pressure to remove every trace of abrasive compound. If any of this compound gets inside an engine it will rapidly wear on the rings, pistons and cylinder walls.

Once cleaned, the plug electrodes must be filed and reshaped. Be sure to clean the filings from firing end when done. Also clean the threads with a wire brush, but don't touch the insulator with the wires. A metalic coating on the insulator may cause a short circuit in the plug.

It's also a good idea to wipe the upper insulator and terminal with solvent to remove greasy fingerprints or films which may cause flash-over inside the boot.

Any spark plug, new or used, should be gapped before being reinstalled in the engine. Yes, the factory pregaps new plugs but they should still be double-checked before installation. The gap information is also on the decal inside your engine compartment. If not, it is in your workshop manual.

The gap is checked by inserting the proper thickness wire or a spark plug gauge between the electrodes at the firing end of the plug. If there is a slight drag on the gauge, the gap is correct. If the gap isn't right, use the notched adjuster on the gauge body to bend the curved side electrode slightly until the proper gap is obtained.

Put a small amount of anti-seize compound or molybdenum-type thread lubricant on the first few spark plug threads before installing them finger tight. The plugs should screw easily into the engine. If they don't, change the angle slightly because you are probably cross-threading them.

It is best to use a torque wrench to tighten the spark plugs to the specifications listed in your workshop manual. However, if you don't have a torque wrench you can use a spark plug wrench. If the spark plugs don't have gaskets, only turn them an additional 1/16 of a turn beyond finger tight. Plugs that do have gaskets are given a quarter turn with the plug wrench.

Here's another reason for installing new plugs at tune-up time: gaskets shouldn't be reused. And it's next to impossible to find new gaskets for spark plugs without buying new plugs.

You'll also want to check the ignition system before doing the fine tuning. The conventional ignition system (one that has breaker points in the distributor as opposed to an electronic ignition system) is relatively easy to check. However, to best judge the performance of an electronic ignition system you should follow the instructions in your vehicle's workshop manual.

There are two ways to check a conventional system. The first, best and safest way is with a voltmeter. The other method is the good, old-fashioned jumping blue spark style.

For the voltmeter test you first remove the coil high-tension cable from the distributor and ground it to the engine block. Then you connect the voltmeter's positive lead to the coil terminal marked BAT or +, and the negative lead to a good ground.

Crank the engine. The voltmeter should register 9.5 volts or more. A reading of less than 9.5 indicates a primary ignition circuit problem.

To do the old-fashioned test without a voltmeter you'll need a screwdriver with an insulated handle. First you disconnect one of the spark plug wires. Remember, if you don't have a spark plug cable remover, only twist and pull on the boot. Now push the screwdriver head into the connector inside the boot.

Holding the screwdriver by the insulated handle, place the shank about half an inch away from a clean engine ground. A bright blue spark should jump the gap between the screwdriver shank and the ground when the engine is cranked. (See why you're holding onto an insulated screwdriver. That would have been a dandy shock!) A weak yellow or orange spark points to problems in the primary ignition circuit.

The primary ignition circuit includes the battery, ignition switch, ammeter (or warning light), coil primary winding, breaker points, condenser, ballast resistor and low-voltage wiring. If you're doing the blue spark test, a weak spark could also mean you have rotor damage, distributor cap problems or the particular spark plug wire you're using is bad.

Although electronic ignition systems can be checked with the blue-spark method, it is really best to follow the test steps outlined in your vehicle's workshop manual.

OK, now that you know that the engine is sound enough to be tuned, all you have to do is get the fuel and ignition systems working together. That's what the Backyard Mechanic will help you do in the final installment of this series next month.

Safety First

Set the parking brake and chock the wheels. Put manual transmission in neutral, automatic in park.

Operate the engine in a well-ventilated area only.

Keep hands, hair, loose clothing and test leads well away from moving engine parts.

Don't touch hot exhaust manifolds, radiators, spark plugs and coil terminals.

Never look into a carburetor while the engine is being cranked or is running.

Don't smoke, use open flame (torch) or allow sparks to occur near the carburetor, fuel line, fuel filter, fuel pump, spilled gasoline, cleaning solvents, other flammables or a charging battery.

Be very cautious using anything electrical within 18 inches of the floor.

Gasoline is NOT a cleaning solvent.

Keep a fire extinguisher rated for gasoline and electrical fires handy.

Use the proper tool of the proper size and fit for every job.

Wear safety goggles when drilling, grinding or using a chisel.

Don't wear rings, watches, bracelets, jewelry, neckties or loose clothing.

tteecc!h! double tech with tsgt ron lathrop

COMMENT: My 1979 performance car has had a bad shimmy in the front. I have had the front alignment checked with steel belted tires and the dealer said the alignment was correct. They commented that the steel belted radial tires had not "set." At 20,000 miles I had put up with this long enough so I bought new nylon bias ply tires and had them balanced. The Exchange garage reset the front alignment and still I have vibrations. What gives?

REPLY: You've probably got a wheel or two that is out of round or has excessive runout, which is not at all uncommon with the custom wheels found on performance cars. Such wheels should be carefully checked *before* purchase to ensure that they are perfectly round. If your wheels check out OK look for a defective shock absorber. From there, move to loose or worn wheel bearings followed by worn suspension or steering parts.

COMMENT: I have done my oil changes for the last 20 years and the problem that occurred recently has never happened before. After I had drained the old oil from my two-year-old compact, put on a new filter, filled the crank-case and started the engine, I had no oil pressure after the usual few moments. I changed to another new filter and still no oil pressure. I removed the oil filter completely and with someone watching there was still no oil being pumped. In desperation I "primed" the oil pump with a hose and some oil. After two attempts I was successful in regaining oil pressure. What happened? Was it an airlock, an oil drain out or a stuck pressure relief valve? Will it happen again, or happen at high-speed driving?

REPLY: At first I thought you might have had air in the line to your oil pressure gauge, but as you went on and there was no oil being pumped I knew you were in trouble. While an air lock or oil drain out are possible, they aren't very likely. A sticking oil pressure relief valve is a better possibility. Other problems that could cause the problem include: a blocked passage on the pressure side of the pump; a blocked oil pickup screen or tube; a loose oil inlet tube; a pump malfunction; or foreign material in the oil pump.

Because this can happen again, it would be best to replace the oil pump and, while you're at it, clean the oil pan. Also, if I were you I'd check the fuel pump; it could be damaged too.

COMMENT: The April 1983 DRIVER article "Getting Started: The Power of Life" states that connection of cables should be done with the "alive" car running. I've always understood that the hookups should be made before the "alive" car is started as a safety measure to keep fingers and cables away from moving fans and belts. Does the article reflect a change?

REPLY: No. We were wrong, but read on.

COMMENT: At an AAA car class last week the instructor said a jump start could be made with the good car's engine *not* running. In fact, he said it was safer to jump a car this way. I was wondering about your thoughts on this method.

REPLY: Continue reading please.

COMMENT: On page 26 of the April 1983 DRIVER the steps that should be followed when jump starting should be revised as follows. Turn off "alive" car. Connect cable's as indicated (postive to positive and "alive" negative to "dead" car's frame or engine block). Try to start "dead" car for approximately five seconds. If "dead" car will not start, then turn on "alive" car, repeat procedures. The first concern is safety as indicated in the article, but a small spark is not necessary. That one spark could explode the battery.

REPLY: OK, for the record: the good car's engine should NOT be running while the cables are being connected. However, there will still be a spark when making the last connection. That's why the last connection (to the dead car's frame or engine) is made as far away from the battery as possible. Once everything has been hooked up properly, then attempt to start the dead car using only the live car's battery power — in other words, with the live car's engine and ignition switch OFF. If this doesn't get the job done, it's highly unlikely that starting the live car's engine is going to help. The dead car needs more than a jump start to get started; it needs work.

The idea behind not having the live car's engine running is simple. If there is something major wrong with the dead car's electrical system, the jump can only damage the live car's battery. If the live car's engine were running, you could ruin its electrical system by connecting it to a defective car.

COMMENT: I've seen several references to the possibility of batteries exploding, but have not yet seen a clear explanation of the cause(s). I'm not interested in a highly technical explanation, but would like to know more about what situations or actions I need to avoid to keep a battery from exploding.

REPLY: In the normal operation of a battery, oxygen is freed from the lead peroxide plates (positive plates) and unites with hydrogen split off from the sulphuric acid to form water. Charging or jump starting reverses this action. Now anytime that you have oxygen and hydrogen gases present and induce a spark you form water — but it is a very explosive formation, and in the case of a battery, one that will spray the sulphric acid everywhere.

COMMENT: I have a problem that confuses me. When I am driving down the road with my air conditioning on in my 1982 sub-compact car at a steady speed, I can feel a loss of power for a very short time and then it seems like it gets it back. When I noticed this I stopped and pushed on the accelerator at a high idle. I could hear the rpm's decrease considerably and then increase. And it repeats over and over. My car is still under warranty but I really don't have the time to take it to the

dealer. I was wondering what the problem is and how to fix it.

REPLY: The air conditioning compressor usually doesn't operate full time but works in cycles, cutting in and out as you drive. In today's smaller cars the air conditioner can rob the engine of as much as a quarter of its horsepower when it cycles on. Thus, the power loss you feel and the rpm drop you hear over and over may be the normal A/C cycling.

To quickly check this, try driving without the A/C and see if you notice the same power loss. Also do your high idle check without the A/C. If you don't encounter these problems then your concern is probably with the air conditioning.

If you think that the A/C is cycling too often or stealing too much power, you should first visually check the system. With the engine off, carefully look over the belt, compressor, pulley, built-in electro-magnetic clutch, hoses and fittings for any signs of trouble. Also make sure the belt isn't too tight.

Next you'll want to check all the vacuum hoses and connections associated with the operation of the A/C system. Operating off a vacuum tank, these lines connect to the dash panel, A/C switch and vacuum actuators. A small leak here could cause the cycling.

However, the most common causes of too rapid cycling are defective thermostatic or pressure sensing switches. Although systems vary, the basic switches are low-pressure and high-pressure cut-outs, thermal limiters, superheat switches and, in some cases, ambient temperature switches which check for outside temperatures.

The major obstacle for you with all these switches is that they can't be adjusted; they have to be replaced if defective. Because the only source for such switches is also the best place to have their operation checked, you really should take your car back to the dealer. Especially since it's still under warranty.

Your car may also have a couple of other switches that could cause too rapid cycling if they were defective. There is a time delay relay which prevents the compressor from engaging for 10 seconds after the ignition switch is turned on or the selector lever is placed in the A/C mode. And there is a compressor cut off switch which prevents the compressor from operating during wide open throttle conditions in high gear. Again, these switches are best left to the dealer for checking and replacement.

Also, an overheating engine will cause these switches to cycle the air conditioning. So there is also the possibility that the switches are working as they should and you have an engine malfunction.

COMMENT: I am looking for information on the Volkswagen Bus. Specifically, I'm looking how to best handle and be prepared for varying road and weather conditions. However, any information on this unique automobile would be thankfully received. If you can't supply any information I would welcome any suggestions for other possible sources. A high profile vehicle such as the Volkswagen Bus has several characteristics which make it unique. I believe you have had articles on other high profile vehicles such as Chevy vans, etc., but to my knowledge no one has done a comprehensive article on the safe maintenance and handling of the VW bus.

REPLY: Let's start with safe maintenance. It is pretty much the same from vehicle to vehicle. The best maintenance information is contained in service manuals that are readily available at any large auto parts supplier or book store.

Now driving safety of any high profile vehicles begins with proper loading. The idea is to keep the weight as low and as evenly distributed as possible. This not only means keeping the load even front to rear but also left to right.

In addition, make sure that everything put inside the van is securely stowed or fastened down — especially the passengers! Everybody should buckle up and don't carry more passengers than you have safety belts, even if they're in the bed in the back.

There are two types of movement that affect a van's handling: pitching and yawing.

Pitching is nearly always caused by road surface undulations and, in most cases, will be checked by the vehicle's suspension. However, under certain conditions the initial pitching can develop into a gyrating which, unless it's controlled by gentle deceleration and steering movements, can result in total loss of control.

While yawing or swaying can be induced by road irregularities, it is usually the result of high cross winds, or worse, by the wake of large trucks. The first time a large vehicle passes you can be quite alarming. The turbulence generated by it threatens to pick you up and throw you right off the road. The only action you can take in this case is to drive as far over to the right as possible to minimize the effect of the turbulence and to be prepared by using your mirrors to spot overtaking vehicles.

In all cases, when instability reaches such a stage that you have to take action, do NOT use the brakes. Simply slow down and the van will stabilize as its speed drops.

These instabilities can be minimized by careful loading. Remember, instability is greatly exaggerated by excess speed. So drive according to conditions.

Head winds can be as much of a problem as crosswinds. This is especially true when you were planning on passing and find yourself going slower instead of faster. And if you aren't fighting a head wind while passing, you've still got to be careful not to build up too much speed.

You've got to anticipate what other drivers might do more with a van than with a car because of the greater stopping distance required. However, the first rule of anticipation is to plan your routes so that you avoid such problems as narrow roads and steep hills.

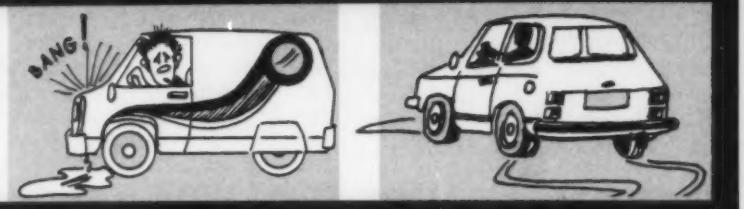
Actually, freeways are just about the ideal places for driving vans. Here you can have a nice relaxed (not *too* relaxed) cruise at about 50 mph in the righthand lane while the rest of the world rushes past. But don't forget that your two-second gap behind following traffic is doubly important because of your greater stopping distance.

The best way to get to know more about your van is to seek advice from experienced van owners and dealers.

EDITOR'S NOTE: If you have a general interest automotive question that you would like answered, and feel others could use the knowledge too, send it to:

Double Tech
DRIVER Magazine
HQ AFISC/SEDD
Norton AFB, CA 92409

BACKFIRE
LETTERS to the EDITOR



EXPLODING AFTER THE FACT

In reference to your April 1983 issue I read with interest your article in The Backyard Mechanic "Getting Started: The Power of Life."

Let me relate a hair-raising experience which happened to me and my 1973 Chevy Van camper.

I have a main and an auxiliary battery which have lifetime guarantees that I purchased in November 1973. I have used about six batteries in the past nine plus years.

Whenever the main battery "dies," I use the auxiliary battery to start the van. While I have done this many times, I always watch for a battery explosion and connect the "alive" battery to the "dead" battery by connecting positive post to positive post and negative to van frame.

After I replaced the starter and solenoid on my van, I had to jump start the engine by using the auxiliary battery. I made the proper connections, started the engine from inside the van, got out and removed the jumper cables. I closed the hood, got back in the van and turned off the ignition. I wanted to check the ease in starting the engine. When I turned the ignition key a loud "shot" rang out and I heard liquid dripping. I got out, raised the hood and saw that the main battery had exploded.

Realizing that the battery could have exploded in my face, I was a little nervous and concerned. The battery exploded *after* jump starting when the ignition was turned on.

I'm passing this information to you in hopes of preventing a serious injury to someone.

Maj Alvin L. Milam, USAF
Wright-Patterson AFB, OH 45433

YOU'VE GOT TO BE SKIDDING

Although I like to think I am a safe driver of both cars and motorcycles, I find several good ideas about improving my driving habits in every issue of DRIVER. Keep up the good work!

However, I do have a question. In your May 1983 issue ("Hodge Podge" article) you mention that the best method to regain control of a skidding automobile on slick ground is to turn into the skid (using a "light" touch) and pump the brakes to decelerate. Isn't pumping the brakes only useful for rear-wheel-drive cars? Although I don't own one, I have heard that the best method for regaining control of a front-wheel-drive car is to accelerate and turn into the skid, which implies a whole new mindset, and lots of practice.

Is my belief in error? Also what about four-wheel-drive cars so engaged? What is the best method for them?

CPT Joseph S. Yaversky, USA
Ft Hood, TX 76545

Accelerating a skidding front-wheel-drive vehicle is a trick used by race and rally drivers who've practiced the technique for thousands of miles. In fact they often accelerate and brake at the same time. However, for the rest of us skids are defined more by which end of the car is skidding than by which end (even if it is both ends as a four-wheel-drive) is driven. Regardless of which end is skidding, the best practice is to disengage the clutch on manual transmission cars or take your foot off the accelerator on automatic transmission vehicles. If the rear of the car is skidding, steer into the skid. In the rare case where the front of the car is skidding, hold the wheel still (you've already turned it or you probably wouldn't know it is skidding) until the car slows and starts to take the turn the way you want it to. See the January 1982 DRIVER for complete skid control details.

WAS IT "DEAD" OR "ALIVE"

While reviewing your May 1983 issue, I noticed page 24 had a photo of an individual connecting two leads to the battery terminals. This is a dangerous way to jump start a car. The caution sign on the battery explains how to jump start the battery correctly.

TSgt Tom Loucopolos, USAF
Kirtland AFB, NM 87118

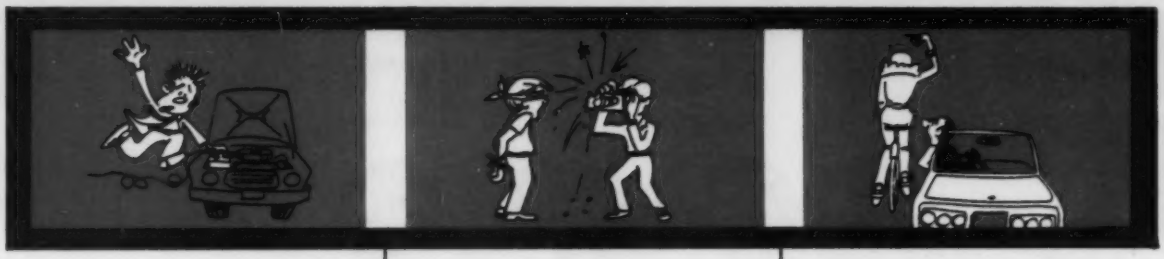
We think you think the battery being connected up in the photo was the dead battery – it was the live one, and is as correct as possible.

RIDICULOUSLY SIMPLE!

I can fully sympathize with SMSgt Malik's frustrations (May 1983 Backfire Column) when he discovered fixing his instrument panel lights would require major surgery on his dash.

When a simple light bulb in my instrument panel burned out, I took it to a dealer and told them to change it for me because I couldn't get to it myself. I was shocked to learn they couldn't without taking the entire dash apart at a cost of $45 per hour, minimum labor two hours.

This is ridiculous! Everyone



knows light bulbs eventually burn out and need to be replaced. Auto designers and manufacturers need to go back to the drawing boards and design dash lighting that can be easily replaced by the owner who is so unfortunate to not have an advanced degree in auto mechanics. Better yet, why not design dash lighting with fiber optic bundles, replacing the maze of electrical wiring now needed to supply power to all the fancy lights that nobody can get to? This way a single source of light could supply illumination to all dash and instrument lighting, and could be located in a readily accessible location for easy replacement.

But then, that is too simple, and wouldn't bring in huge fees to auto mechanics, would it?

Major Aaron C. Alldredge, USAF
Luke AFB, AZ 85301

TAKE HIM OUT AND SHOOT HIM

In the top picture on page 16 of your May 1983 issue ("Leave the Road Racing to the Road Racers") #21 is Eddie Lawson, not Kenny Roberts. Kenny Roberts was riding bike #2 at Daytona.

A1C John S. Willock, USAF
Williams AFB, AZ 85224

You're right! The photographer/writer who confused Lawson's #21 with his teammate's #2 (Kenny Roberts) was taken out to be shot. However, when we went to turn on him and shoot him, the camera broke.

BASIC RULES FOR BICYCLING

I just read your article on bicycling in traffic in the April 1983 issue and concur with your basic advice. Before I say anything further, I want to preface my remarks with this advice: Anyone who is seriously interested in safe cycling, get in touch with a local bicycle club affiliated with the League of American Wheelmen (L.A.W.). It is the largest and oldest bicycling organization in the country, and through its Effective Cycling program it is actively involved with promoting and teaching safe cycling.

I would like to present some tips for safe cycling in traffic:

1. Always ride far enough to the left that you actually claim a part of the road. There are several reasons for this. First, you will avoid the majority of minor hazards along the roadside (the storm grates, broken glass, minor potholes, rocks, etc) that could cause you to make unexpected and sudden movements. Stay approximately 18 inches from the road edge. This of course will vary with road conditions, traffic speed and other variables. Experience is the best teacher here. Second, this will give you adequate reaction room for the most common hazard cars present to bicycles. The average motorist will almost always underestimate the speed of a bicycle, and when he wants to make a right turn this usually translates into passing the bike and then turning directly in front of the bicycle. The bike does not have enough time to stop, but if it is far enough to the left it will be able to turn *with* the car. Annoying, but sometimes necessary.

2. If the traffic is moving at the same speed you are, take the entire lane. This sometimes annoys motorists who just can't believe they should follow a bicycle, even one moving right with the flow of traffic, but it is by far safer. You do not want a car on your left crowding you, he's apt to forget (or not care) that you're beside him and move over into you.

3. To signal a right hand turn when riding a dropped handlebar bike (as your models were) *do not* use the traditional signal. Take a close look at your picture. The photographer was obviously crouching down and shooting up at the model and it still doesn't present much of a signal. To a motorist behind her it would look like she was wiping sweat from her eyes, because all he would see would be her elbow. Point with your right hand, make jabbing motions with your hand bending the arm from the elbow and turn and look at the traffic behind you — this tells the drivers that you know they are there and you are trying to signal them.

4. It takes practice to maneuver in traffic. But, unless there is a large speed differential, you are much safer moving to the left turn lane and making a left turn from there than you are trying to stop and dismount in traffic.

5. Finally, if riding by parked cars, stay far enough away from them so they cannot hit you if they suddenly open a door. After you have been riding a bicycle long enough, you will find that you are simply moving too fast and have too much to watch to be able to look out for people who don't look before opening a door. Where parallel parking is allowed, the average traffic speed is not fast enough for you to present a real hinderance to traffic, otherwise you're going to get creamed eventually. If otherwise, find a different route.

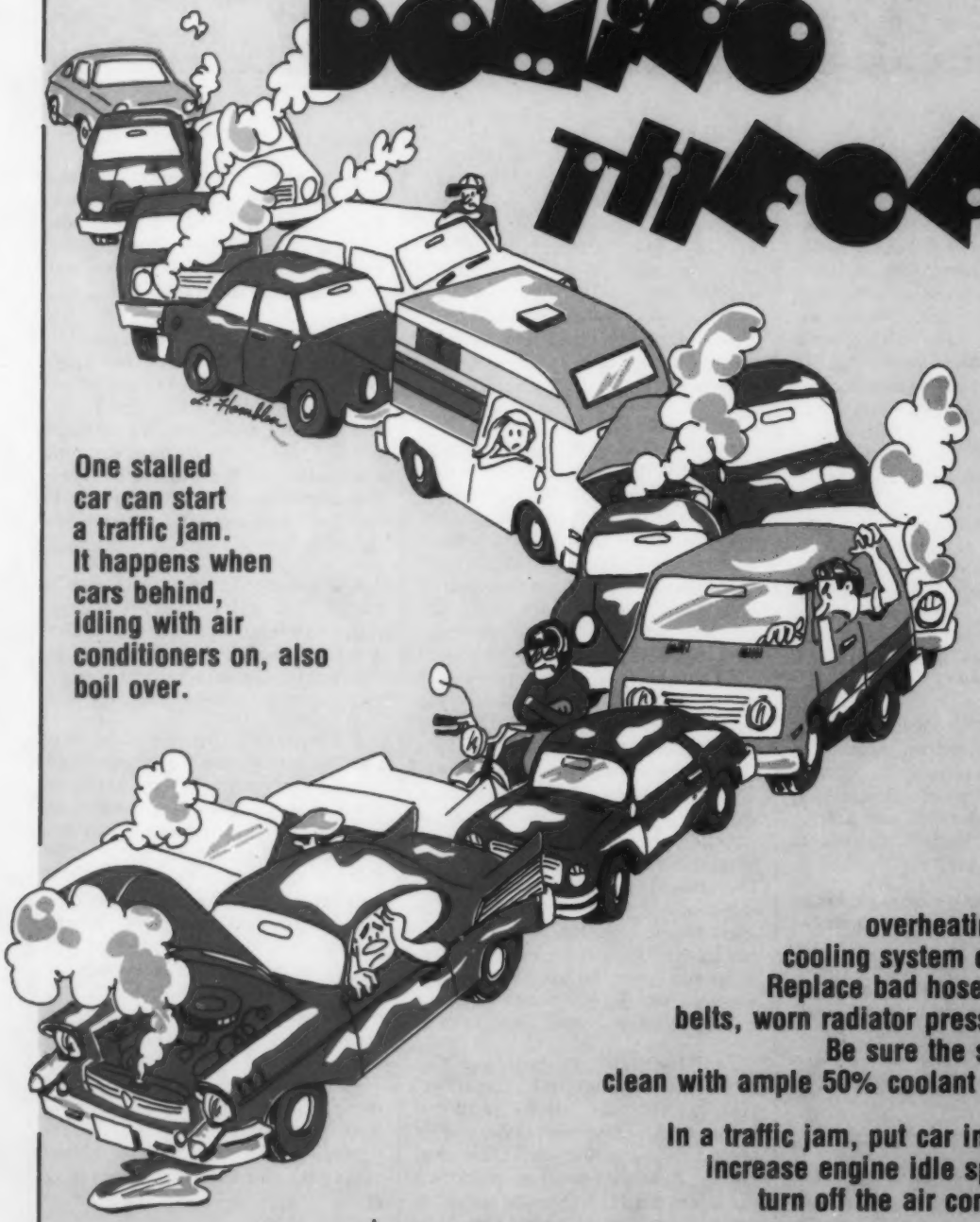
Riding two wheels always takes more skill and attention than driving four; do not jump out into heavy traffic until you perfect the basic riding skills you can learn from a cycling club.

ET2 Michael Fisher, USN
Charleston, SC 29408

★U.S. GOVERNMENT PRINTING OFFICE: 1983 683—027/9

AUTO FACTS

THE DOMINO THEORY



One stalled car can start a traffic jam. It happens when cars behind, idling with air conditioners on, also boil over.

Prevent overheating with a cooling system check-up. Replace bad hoses, frayed belts, worn radiator pressure cap. Be sure the system is clean with ample 50% coolant solution.

In a traffic jam, put car in neutral, increase engine idle speed and turn off the air conditioner.

car care council